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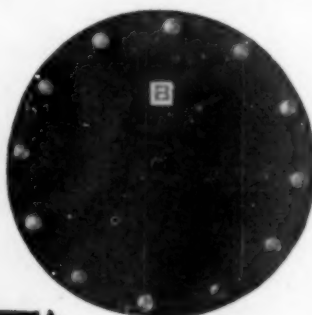
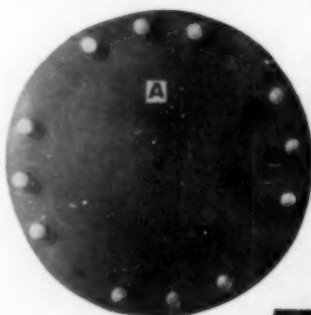
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Volume II

MARCH, 1917

No. IV

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Inductance and Capacity Phenomena

By John H. Morecroft

Associate Professor of Electrical Engineering, Columbia University, New York City.

The history of science tells us that the theory is more important than the practice. The theory is developed for its own sake and the practical applications usually follow. You will have a chance to apply that to this article. To some of the readers it may seem entirely theoretical, but it is of the greatest practical importance. Read this article with care; it is of practical value to every amateur operator.—Editor.

RESONANCE curves of inductance and capacity in parallel show that the apparent inductance of a coil can be increased by shunting the coil with a condenser and that the amount of increase obtainable depends upon the resistance of the coil and condenser, a leaky condenser or one having much dielectric loss giving but small available increase in inductance. Increased in inductance obtained in this manner is always accompanied by a large increase in the apparent resistance of the coil. If the amount of capacity shunted across the coil is such that the product of the inductance and capacity of the combination (LC) gives a wave length the same as that being impressed upon the circuit the coil acts as if it had no inductance at all but did have a very high resistance. One curve illustrating this point shows an increase in the apparent resist-

ance of the coil from an actual value of 10.6 ohms to nearly 300 ohms.

In investigating the effect upon the reactance (X) and the resistance (R) of a coil produced by a second circuit inductively coupled to the coil, the second circuit being a resonance one, experimentally determined curves show that the apparent resistance of the coil is always increased by the presence of the second circuit, the amount of increase depending upon the degree of coupling and upon the ratio of the frequency impressed upon the coil to the resonant frequency of the coupled circuit. In one case the laboratory results show that a coil having an actual resistance of 6.0 ohms, coupled to a second resonant circuit (the true resistance of which is also 6.0 ohms), shows an apparent resistance of 134 ohms when the impressed frequency is the same as the natural frequency of the second circuit. In this case the coupling is 38%; with decreasing values of coupling this increase over the actual resistance decreases also. For a coupling of 7% the

*Presented before The Radio Club of America, January 19, 1917.

apparent resistance is just double the actual resistance, or 12 ohms, compared to the 134 ohms noted above for 38% coupling. The apparent reactance of the coil in question is also effected strongly by the presence of the second circuit, the reactance being increased for frequencies lower than the resonant frequency of the second circuit and decreased for frequencies higher than the resonant frequency. Curves illustrating these effects are shown in Figures 1 and 2. These results show how the resistance of an antenna may vary as the local circuit is tuned and that this variation depends upon coupling.

circuit. This value can be approximately predicted by placing $LI^2 = CE^2$ where L = inductance of coil in henries

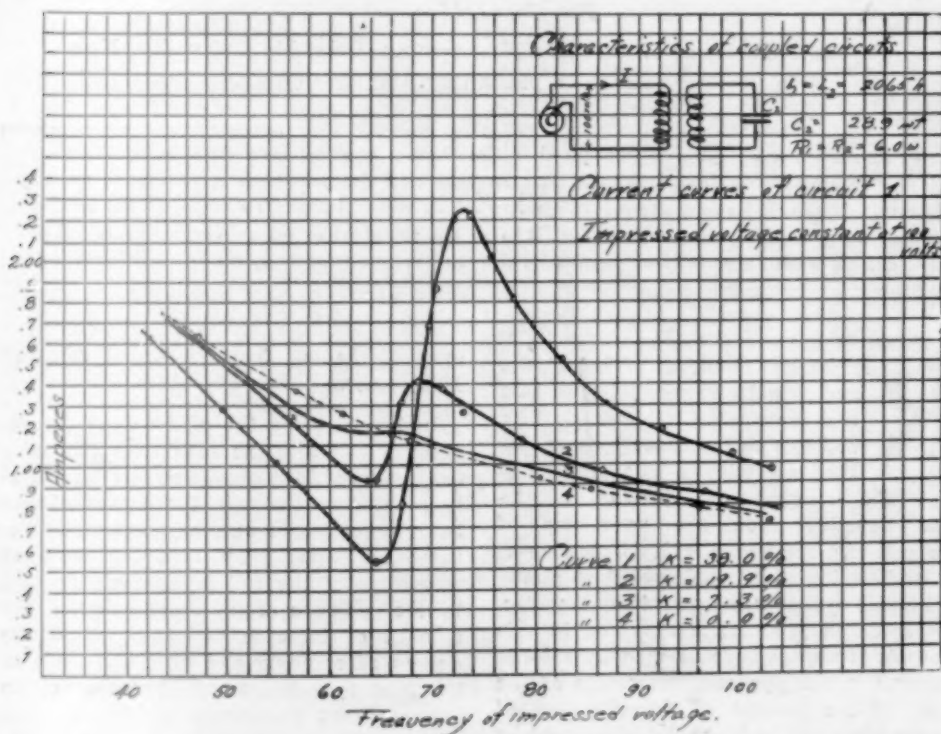
I = current in coil at time of break, in amperes,

C = capacity of condenser, in farads,

E = voltage occurring across condenser.

DISTRIBUTED CAPACITY IN COILS AND ITS EFFECT UPON THE COIL CONSTANTS.

In looking over the available literature I find but little information on the amount



In the consideration of oscillograms showing the forms of current occurring in a "buzzer wave generator" it is apparent that when a condenser is used across the inductance of such a piece of apparatus the voltage occurring across such a condenser may be many times as great as that of the power supply for the buzzer. In a certain case the maximum voltage across the condenser was nineteen times as great as that used for operating the

of inherent capacity of coils, how it may be predicted, how it may be limited, and its effects upon the operating characteristics of the coil. I therefore feel it worth while to give an elementary, non-mathematical analysis of this topic, showing how, in certain constructions of coils, the amount of distributed capacity may be easily calculated.

The first thing to notice is the meaning of the word capacity. Fundamentally it

is defined in terms of the energy stored in the electrostatic field of the circuit. Thus if, with an impressed voltage of E , the circuit stores up an amount of energy (in the form of electrostatic field) of W

$$\text{we have } W = \frac{1}{2} CE^2 \quad (2)$$

$$\text{or if } E = 1 \quad C = \frac{2W}{(1 \text{ volt})^2} \quad (3)$$

where this equation defines the capacity as well as giving the magnitude.

Now consider the case of a condenser and coil in parallel, the coil having negligible capacity of its own. (This is actually

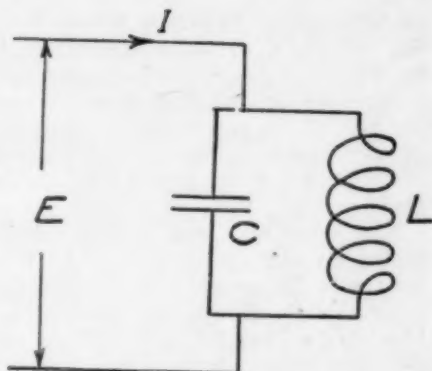
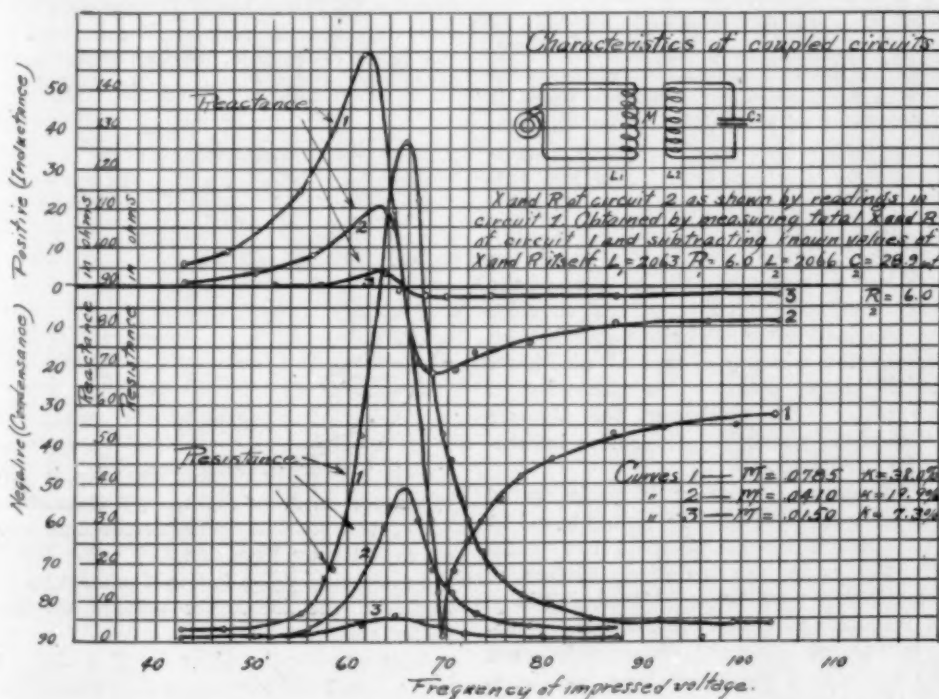


FIG. 3.



the case in the circuit used in obtaining the curves of Figure 1 and 2.) As the frequency of the impressed voltage E is varied, the value of W in Equation (3) evidently does not change. Now assume that we determine the value of C from

*The $(1 \text{ volt})^2$ is left in the equation to keep the unit straight. So far as the magnitude of C is concerned it might be written $C = 2W$

the relation existing between I and E in Figure 3. If I lags behind E the circuit is inductive and if I leads E the circuit is condensive. Evidently then at low frequencies the circuit of Figure 3 has no capacity from this standpoint, it acts like an inductance. But at high frequencies the circuit acts like a condenser because the current leads the electromotive force. The value of C or L obtained from this standpoint is a certain fictitious capacity

or inductance. The true value of L of the coil (or C of the condenser) in Figure 3 has not changed as frequency varied, because the amount of electrostatic energy per volt on the condenser (or the amount of electromagnetic energy per ampere in the coil) has not changed with changing frequency.

Now when we come to distributed capacity we find that the value of C may vary with frequency, even when we consider C from the energy standpoint. A long single layer solenoid with no resistance has indeterminate capacity from the standpoint of energy because there is no difference of potential between any of its parts and hence no electrostatic field is set up. So the expression "energy per volt" becomes meaningless. However, actually, the coil does have resistance so that as soon as a current flows there is a difference of potential between any two points on its winding and hence an electrostatic field is set up both inside and outside the solenoid. The electrostatic energy may be thought of as existing in a series of condensers, the plates of the condensers being made up by parts of the surface of the winding. Thus consider the top inch of the winding and bottom inch of the winding a , and a^1 of Figure 4. These two cylindrical surfaces act as two plates of a condenser, the distance between the plates being about as indicated by the line 1.

The second condenser is made up of two more portions of the winding b and b^1 . The distance separating these two plates is shown as 2. So the whole surface of the winding may be considered as plates of several condensers, the separation between plates being the distances between the two plates, measured along the direction of the electrostatic field which actually exists.

Now let us consider how much capacity such a long solenoid has. Plates a - a^1 have a certain amount of electrostatic energy and the voltage between them is practically the same as the voltage impressed on the coil. Plates b - b^1 have a certain amount of energy but the voltage across the plates is not the same as the voltage impressed on the coil. So for every elementary condenser making up the distributed

capacity of the coil the voltage is different. Hence the total electrostatic energy is evidently obtainable only thru integration or similar process.

However, we may by some process find this total electrostatic energy stored in the region surrounding the coil. Now in defining capacity we use the idea of energy per volt, but the voltage is different for every element of the distributed capacity. We have

$$C = \frac{2W}{E^2}$$

and W is known. But what value of E shall be used in obtaining C from this equation? The value of E between plates c - c^1 (figure 4) is very small compared to the value of voltage between plates a - a^1 . It is evident that the value of C in a

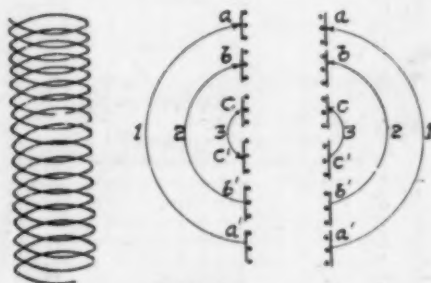


FIG. 4.

circuit having distributed capacity is ambiguous even from the energy standpoint.

It seems sensible to define the distributed capacity by Equation (4) using for E the maximum value it has, for example in Figure 4 use for E the voltage between plates a - a^1 .

This apparently gives to C a definite value, but I will now show that even when so defined, C may have various values, depending upon the value of the frequency impressed on the coil. If a continuous voltage is impressed on the coil the potential at any point on the coil (referred to potential at center of coil as zero) is shown by Figure 5. The fall of potential along the coil is a straight line, because its shape is determined by the IR drop along the coil, which is uniform. The voltage between the plates of an elementary condenser x - x^1 is shown at E_x . The value

of $E \times$ determines the amount of electrostatic energy stored by this section of the distributed capacity of the coil.

Now when alternating current is impressed on the coil the shape of the potential distribution curve changes, because the IX drop as well as the IR drop per unit element must be considered. The

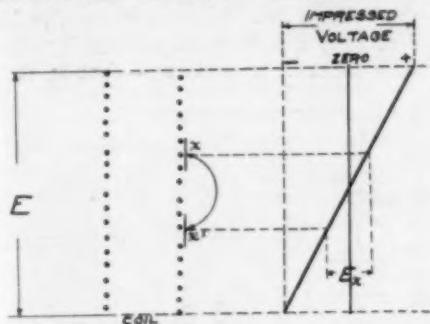


FIG. 5.

current is no longer uniform thruout the length of the conductor and moreover the effective self-induction per unit length of such a coil is different at different parts of the coil, being greater near the middle of the coil than at the ends. The combined effect is to change the potential distribution curve from the straight line of Figure 5 to the curved line of Figure 6.

Now evidently with a given maximum voltage E , the same as in Figure 5, the voltage on the elementary condenser $x-x'$ is different than it was before. Similar

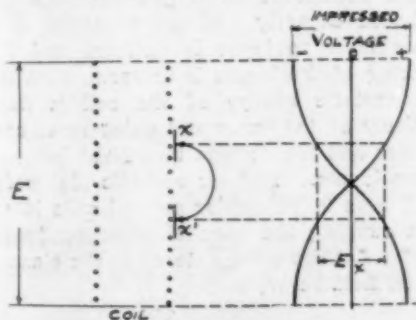


FIG. 6.

reasoning applies to any other part of the distributed capacity, hence it is apparent that for a given impressed voltage E , the same as in Figure 5, the amount of electrostatic energy stored in the region surrounding the coil is different than it was

before. So it must be concluded that the amount of distributed capacity of the coil had been changed with the change in shape of the potential curve. As the shape of this curve depends upon the impressed frequency it is to be concluded that the actual value of distributed capacity of such a coil depends upon the frequency.

In the same way that the potential curve varies with frequency so does the form of the current curve vary with frequency. Figure 7 illustrates how this occurs. Curve 1-1' gives the current distribution for continuous current (frequency = 0) while the other curves show how the current distribution changes with increasing frequency, curve 4-4' being higher frequency than curve 3-3', etc. As the inductance of a coil is properly defined in terms of stored electromagnetic energy per unit of current it evidently would have various val-

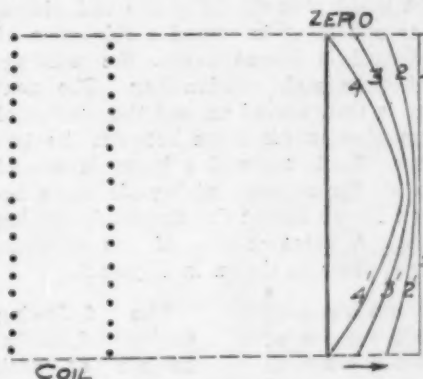


FIG. 7.

ues according as the value of current at the center of the coil or that at the end of the coil is used. For a given maximum of current as shown in Figure 7 the actual value of magnetic energy decreases with increase in frequency, but if L is defined by

$$L = \frac{2W}{I^2}$$

and the value of I at the end of the coil is used then L will increase with increasing frequency. Such a measurement is made when the Wheatstone bridge is used for determining the L of a coil. I have analyzed much further this idea of distributed capacity and inductance but do not deem it well to introduce more such material into this paper.

Now let us consider multiple layer coils.

One would naturally think that such coils must have a very high value of internal capacity due to the proximity of the various layers; in fact, where-ever such coils are mentioned in the literature upon this subject, the internal capacity is spoken of as prohibitive.

It seemed to me, using some of the ideas presented in the first part of this paper, that multiple layer coils could be constructed without getting very high internal capacity, and I show here two coils constructed in such a manner. One of these coils has 20 layers and the other has 10 layers yet the distributed capacity of either of them is low,—of the order of 25 centimeters, whereas the inductance is about 70 millihenries. The novel feature involved in the construction of these coils consists of an air space between each layer. They are wound over a cage-like reel, made by eight wood pins thru the two end pieces. After one layer is wound a thin strip of cardboard is placed across the winding, right over each wooden peg. The next layer is then wound on and the cardboard strips give an air space between the two layers. Each successive layer is wound in a similar manner, giving air space between layers except for the small spacing strips. A cross section of one of these coils appears as shown in Figure 8.

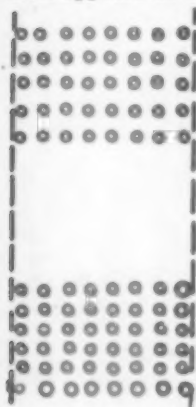


FIG. 8.

For such coils I believe the entire distributed capacity may be represented by a parallel plate condenser, the plates hav-

The following analysis of the behaviour of such coils is based on two approximations which are fairly exact if there are several layers (say more than 10) and the cross section of the winding is such that all turns link all the magnetic flux set up by the coil. In the coils here shown the conditions are nearly fulfilled.

ing an area equal to the average area of one layer of the winding and the separation of the plates being equal to the dielectric distance between the inner and outer layers of the coil. This idea is, I appreciate, rather revolutionary, but I will try to justify it. My first premise follows from the coil construction. It is this—the voltage drop between successive layers of such a coil, when excited by alternating current, is uniform,—that is, if 20

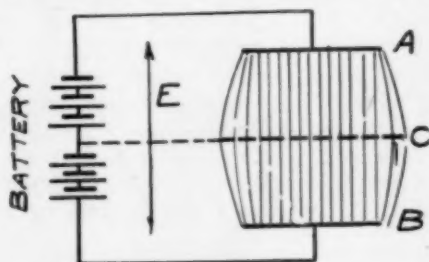


FIG. 9.

volts a. c. are impressed on a 20 layer coil, there will be a drop of one volt from layer to layer. This follows from the statement that all turns link the flux, it being assumed that the IR drop is negligible compared to the IX drop. Such being the case, all layers except the top and bottom ones, contribute nothing to the electrostatic field set up by the coil, and hence contribute nothing toward its distributed capacity. If the potential drop from layer to layer is uniform and the spacing of the layers is uniform, then the electrostatic energy of the coil is fixed entirely by the inner and outer layer condenser and the voltage impressed between these layers. To bear out this idea refer to Figure 9. Consider several cells in series exciting the parallel plate condenser A-B. Let the energy stored in the electrostatic field be W, then

$$C = \frac{2W}{E^2}$$

Now let a third plate C, connected to the center of the battery, be introduced half way between A and B. Neglecting the decrease in dielectric distance between A and B due to the finite thickness of plate C, the stored electrostatic energy in con-

denser A-B is the same after C is introduced as before and hence, as the voltage E has not been changed by the introduction of C, the capacity of the combination A-C-B is the same as the capacity of A-B alone. And so any number of plates can be introduced between A and B and, provided that they are connected to the battery at the same relative points as they occupy between A and B, the capacity of the whole set of plates is just the same as the only plates A and B were present.

If, however, the interposed plates are not connected to the same relative points of the battery as they occupy between plates A and B, the electrostatic energy changes and so the capacity of A-B changes. The various layers of the multiple layer coil correspond to the extra plates of Figure 9 and so do not contribute anything to the internal capacity of the coil. Experiment seems to verify these conclusions and two such tests are given herewith.

Coil No. 1. 20 layers.

Area inner layer = area outer layer
= 81 sq. centimeters

Dielectric distance between inner and outer layer = actual distance minus the thickness of the wires making up the intermediate layers = .56 centimeters.

Capacity = $\frac{81}{4 \times .56} = 11.6$ centimeters.

Now a condenser of such small plates separated by such a comparatively large distance has a very large capacity additional to that directly between the two plates. I have supposed that the actual capacity is equal to twice that calculated above which gives

above which gives $C = 2 \times 11.6$ centimeters = $2 \times 6 \times 10^{-5}$ microfarads

The L of the coil measured at low frequencies is 72 millihenries. Hence the natural wave length of such coil is

$\lambda = 1885 \sqrt{72000 \times 2.6 \times 10^{-5}} = 2600$ meters
The value as measured by a wave meter was 2850 meters.

Coil No. 2. 10 layers.

Capacity calculated = 13.5 centimeters.

Estimated capacity = $2 \times$ calculated capacity.

= 3×10^{-5} microfarads

Measured value of L = 66.2 millihenries.
Calculated natural wave length = 1660 meters.

Measured value of wave length = 2600 meters.

The above approximate analysis of the behaviour of multiple layer coils will not satisfy anyone wanting to know exactly what goes into such a coil, but it is good enough to enable the designer to predict the internal capacity of such a coil and is therefore useful.

These multiple layer coils are very useful for long wave receivers; not only can a large inductance be obtained with a very small coil but the distributed capacity is localized in the coil. The electrostatic field does not extend a long distance from the coil as does that of a large single layer solenoid. Hence the adjustments of tuning, using such coils, is much more easily accomplished than when large single layer solenoids are used; it is the presence of the operator's body in the electrostatic field of these large coils, changing the distributed capacity of the coil, that gives such remarkable effects in the reception of continuous wave signals.

There is a formula which gives approximately the value of L for multiple layer short coils.* Then their internal capacity can be calculated by the method I have outlined and so the amount of added variable condenser for tuning to any wave length can be predicted. Thus coil No. 1 described above was designed to use on a 7500 meter wave. The amount of external capacity required is .0002 microfarads as the internal capacity is about .000025 microfarads. The tuning with the outside condenser is sharp, even tho it is only eight times the internal capacity. That is, I believe, due to the fact that the coil suffers but little change in its internal capacity with the change in external capacity. In a long single layer solenoid the internal capacity changes very much as the external capacity used for tuning

Continued on page 57

*See Cohen Formulae and Tables for the calculating of alternating current problems, (page 60).

Amateur Number One

By Irving Vermilya

This concludes Part One of Amateur Number One which appeared in February. The very fact that part of Mr. Vermilya's article has been read means that all this description is unnecessary. It's a rip-roaring article with sparks all over. The decrement of this second part is far less than two-tenths.—Editor.

BUT fellow "Knights of the Air", to get back to the wireless. Of course the telegraph line experience ran all through my career as a wireless amateur. But nevertheless, I emerged back to wireless a full fledged fairly good Morse operator, after a year or so on the old line.

Things began to happen pretty quickly now, and in the Fall of 1904, I reconstructed my old "nailed to the cross" aerial, and put one up that was four hundred feet long and about seventy feet high. It had twelve wires in it, and a great spreader at both ends. The minister again came to my aid, and showed me a new detector that had just been invented, consisting of two carbons and an oxidized needle. I quickly made up one of these and got a telephone receiver from Bunnell's. Well boys, the air was not full of signals, you can take my word for it, but at least there was more doing than when I had tried it two years before. I listened in, and frequently heard signals, but could not read them. You see, I was hearing Marconi tests, and one or two ships he had fitted up, and they were using the Continental code. Of course there were no amateurs in those days, and I was very lonesome. If I had had a couple of kilowatts and an audion, I believe I could have worked to the Pacific, for there was absolutely no jamming.

I came across an article in a New York newspaper one day, that said a certain Mr. William Smith had gotten pinched for causing an electrical disturbance in an apartment house. I thought this fellow would be a good sort of a chap to get acquainted with, as he was a man after my own heart, his chief desire being evidently to cause any kind of a disturbance, electrical or otherwise. I wrote him

a letter, and invited him to call on me. He did so, after spending his five days in jail. I asked him just what he had done, and—well, you'll laugh when I tell you—He had constructed an enormous magnet out of an old cannon. (Later I saw it, and can vouch for all this.) On this cannon, he had wound at least five miles of No. 18 bell wire. Then he made up a storage battery of over



"Tin pans, steel knives and forks left their places only to come up against the wall with an awful crash."

seven hundred cells, constructing them from old lead and small jars. This battery gave nearly fourteen hundred volts pressure. He had pushed the old cannon close up to the wall, and turned on the juice. What happened in the next apartment as well as his own, can well be imagined. Tin pans, and all manner of tin and steel knives, forks and what not, left their places, only to come up against the wall with an awful resounding crash. He said he almost caused the death of an old woman who lived in the next rooms, and they knew darn well it was some of his work.

After he had related his story and I had

called on him, I decided he was just the right kind of a fellow with whom to start something. He was an engineer in the Hudson tunnels, I believe, and had all manner of lathes and tools to work with. I explained the mysteries of wireless to him, and asked him how about setting up a station. In the course of a short time, this was done, and I was the proud possessor of an eight inch spark coil, and he had a twelve. We had the whole earth and air to ourselves, and had a great time, until one fine day I heard a strange spark come in. I listened and this fellow didn't seem to know just what he was doing. The letter "V" had not yet been thought of as a test letter, and he was making an awful roar. Finally I heard him sign off "PT". I immediately called him up and started off by asking "Who the H—are you?" He shot back, "Brooklyn Navy Yard". Well fellows, I must laugh now when I think of it. I told that guy that I wanted it understood that he was NOT to use that infernal spark of his while Smith and I were working, to which he very obediently said he would be very careful not to interfere with us in the future.

Again things moved very rapidly, and one dark night I heard some one calling "VN" and signing "NY". I answered and it was Duffy at 42 Broadway. He wanted to know what ship I was. I told him the "Good Ship Hardship". He didn't even say as much as thanks.

With the coming of "WA", "DF", and a raft of ship stations, I finally decided that I was not making enough noise and a larger set would have to be installed. I scrapped around, and finally got hold of a quarter kw. type transformer from Clapp-Eastham. This worked great, and the stations were getting thicker and thicker. I cannot definitely recall who was the next amateur I heard, but I do recall that Dr. Hudson was one of the pioneers. He made an awful slash in the air one night and I gave him a shout and asked "Who is it?" He managed to tick out very slowly—"This is Dr. Hudson; I am at Dr. Besse's house on Broadway and 144th Street. Who are you?" I told him who I was, and extended him a hearty welcome to the atmosphere. He asked me if I would come down to help him put up an aerial, as he too,

wanted to get in the game. I told him I would, but sorry I am to this day, I never got around to it.

It so turned out that Dr. Besse was "a regular guy", when it came to building transformers. He would turn out a couple of kilowatts transformer over night, so I got him to make me one. Poor Dr. Besse. I have always felt sorry for him. He used to sign "HB", and although he said "A bear can learn to telegraph," his speed never exceeded five words per minute. McClarney, who used to be night operator at the Waldorf, nicknamed him "Queen of the Glue Factory," and it always stuck to him. How well I can hear old Mac now calling up "HB" and proceeding at the five word per minute speed, saying "PLEASE KEEP OUT," only to have the "Queen of the Glue Factory" come back with "What? please send slower". Mac had a most terrible temper, and a most beautiful way of swearing. He would tell old "HB" one or two things at about forty words per minute, and then finally go to the telephone and tell him what he had so vainly attempted to say by wireless.

I worked Besse's transformer for a few weeks, and then decided it was a misfit, and not designed right, so I called on Dad again, and acquired the money necessary to get a one kilowatt Type E. I turned the old transformer in to Clapp-Eastham,—and I must say here a word of praise for them—they allowed me the full price on it toward the one kilowatt. Fellows, here is one of the whitest firms in the business.

Amateurs began to come in galore now, and among some of these I can recall: Weiss "PN," Runyon "WA," King "FK," Hudson "DR," Besse "HB," Skinner "SK," Meyers "DX," Boeder "FH," Goldhorn "GH," Barrett "DB," Macoy "DM," Cannon "CC," Ruppert, Minners Bros., Donahue "GD", Birchard "B", Pacent, Pfeifer, Sharronbeck, Sharp, Shaughnessy, and there are possibly fifty others who are real old timers. One in particular, I can remember his call "SY" from Yonkers, but I cannot think of his name.

Now I am going to expose a very bashful friend of mine, who very much dislikes notoriety, but he is going to get some just the same, if the editor only keeps up courage with me. This fellow is no less than

Arthur Boeder, who is right among the thickest of you, and who is doing some of the best work among you today. Do you know where he learned a great part of his Morse, fellows? Well, it was sitting out under my aerial at night, with an old lantern,



"Hats off to his keen wits and not my bum sending; he turned out to be a dandy little operator."

a pad and pencil, and listening to some of the spare juice running off the tip of my bum aerial. He was too bashful to even come in and call on me. I never knew he was there at all, until he told me of it years later. Mr. Editor, why don't you go down and "mug" him for our QST? I am just writing this paragraph to get his goat.

Hats off to his keen wits and not my bum sending, as he turned out to be a dandy little operator, and long before he was out of short pants, he left lots of others in the dust who had plugged and plugged at it. I might just as well admit it, before he tells you to get back at me, that he has one of the finest sisters a brother ever wanted to have, and she can send, too. At least she used to, for after I knew her, my electric light meter registered at least ten dollars a month more for juice consumed in talking to her. Call her up fellows, and ask for Julia. She signs "JB." I'll let you go now Arthur, although I'd like to tell 'em how you went and asked Mr. Hughes of the United Wireless for a job, and your head hardly came up to his knee, and he said

"Yes I'll give you a job, my boy, but you will have to have on long pants first".

Once again the air reverberated with a terrible crash, and after I had jumped a yard or so, I looked up to see if my aerial was still up. I had visions of it laying in a melted heap, as I didn't see how anything less than a ten thousand volt current could make such an uproar. I got up courage, and took another listen—all quiet—so—I came out with my famous question, "Who the h——". For an answer this time, I got—"This is George Curtis Cannon, ten blocks away with a two kilowatt. How do I come in?" "It's fine", I answered. "Thought I was shot." Well, needless to say, it didn't take us long to get together, and when we did, a most interesting race began. I looked at his two kilowatt, and then went home and looked at mine. It looked like a toy. Once more I touched up the generous Dad I then had, and told him I had to have a two kilowatt in order to make myself heard. I got it, and then invited Cannon down to look it over. He immediately ordered up a three kilowatt. Good night! My brain nearly busted trying to figure up some way of beating this out. I had an old motorcycle, and together with some old junk, and an approaching birthday, I managed to scrape together enough to order up a five kilowatt Type E transformer and condenser from my old friend Clapp-Eastham. I went to Cannon, and again invited him in to see something. There was nothing to it, fellows. He just said "By G—— I've got to get one of them things, too," and out went his order by telegram, —he couldn't wait for a letter,— "Please ship by express, freight too slow". I then got Mr. Cannon down one day and said "Now lets call this thing off. I guess we can both make quite a dent in the air any time we feel so inclined". He agreed,—and there we were, each with a great five kilowatt and only ten blocks apart. Well, we turned to look the situation over, and see if we could reach Japan or so. (We had read—"Get a mile for every watt consumed.") Oh yes,—maybe we do now, but not in those days.

At that time there were lots of electrolytic detectors in use which contained wire worth thirty-five cents an inch. Every time Cannon or I started up, I guess we burned

up about ten inches of some poor struggling hams' detectors who happened to be listening in. Cannon finally bought the wire by the yard and sold it to the kids that came to tell us we had put their detector on the bum.

While Cannon and I were working one day, we suddenly stopped to listen in to see what was doing. There was Pickerel "PK" at the Waldorf, and he was cussing us out for further orders. Among other things he said "Those? X!!!X blankety blank pirates up in Mount Vernon have bent the diaphragms of my phones. How the—(more



"Had a little argument with 42 Broadway—On,—and left a book on my key."

blanks)—Sam Hill can I get what you're trying to say". He was trying to get some messages from "DU", old Bellevue Hotel in Philadelphia.

While I am on the subject of "WA", I want to again assert that Mr. Jacob Weiss DID hear the static discharge from the Waldorf aerial, as I had heard it many times myself, and upon investigation, found that during certain times, a spark would jump his anchor gap with a loud click every time he threw his aerial switch to the sending position.

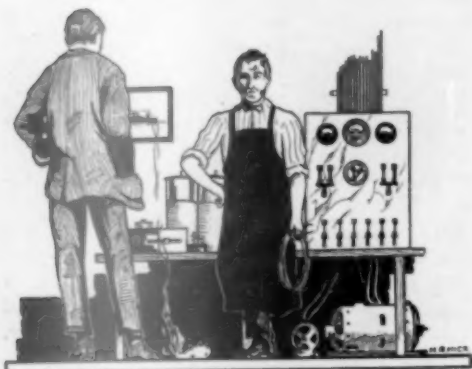
A few days after this most beautiful call down that we had received, I was surprised to hear a continuous roar in my phones from Cannon's spark. I sat there fully ten minutes listening to it, and never a let up. Pretty soon, I walked Cannon, and said

he had had a little argument with 42 Broadway, so he left a book on his key when he came out. He didn't seem to worry about it, and before he got back and took the book off, one hour and twenty minutes had elapsed. I am sure no one got much through, as when we listened in, it was as quiet as a graveyard. The navy yard did manage to get up courage then and asked him "what he meant by such actions", to which I seem to recall a reply telling him "to mind his own business and shut up". Can you imagine such talk these days to a Navy Yard? Yes, I guess we were pirates all right; but the other side was just as much to blame, for they always swore unmercifully at us every time we opened up, and we of course did not have to take such abuse from them. As we often said "Get out, you don't own the air". I can remember offering to pay Mr. Payne's carfare up to Mt. Vernon to show him how to tune, when he threatened to come up and chop my aerial down. Mr. Payne was then operator at 42 Broadway, and is now cashier of the Marconi Company.

I heard "NY" call me one day after some very strenuous work on the part of my 5 k. w., and when I answered up, he sent me the following—"Do you want a job on a boat as operator—signed Hughes". Did I? Well, I should say I did. I said something like, "Yea Bo, I'll be down tomorrow". Remember fellows, this was long before oscillation transformers, Government licenses, and so forth were ever thought of. In other words, it was the day when the fellow with the most kilowatts won. I went down, and Mr. Hughes told me if I would guarantee to shut up that d— blunderbuss of a spark of mine while I was away, he would be only too glad to give me a job on a ship to South America, (and I heard him say to Duffy, "I hope it sinks".)

The ship was to sail in three or four days so I started in to get ready. But before leaving, I went up to see the wireless station, which was on the top floor of 42 Broadway. Here I found Mr. Bucher the man who now has the wireless school for Marconi Company, and has written such good wireless books. Well, boys, if you could have seen him the day I met him, you would certainly roar. His face was as black as a coal heaver's, and his shirt torn. He car-

ried a little piece of wire and a pair of pliers in his hand. He asked me where I was going, and I told him I was going to give the station the once over. I asked him what had hit him, and he said that a little experiment he was trying had not



"Where are you going."

come out just right. I heard later, that it was all caused by a rotary spark gap made of celluloid, which had exploded. Some months later, he started his first school, and has had one ever since. I shall never forget the first one. It was about twenty ft. by twenty, and had a few old boxes in it for seats. One buzzer outfit completed the apparatus and two pupils were all I could find about three days after it started. What a contrast to the same Mr. Bucher of today, and his schools!

I dropped in at the Waldorf on my way home, and as I walked into the little station away up on the roof, there was the man who loved me so—Pickerel. Of course, never having seen me before, he did not know me. I very innocently said "I've got a little amateur station and wonder if you have ever heard it?" "Maybe, what do you sign?" came back the answer. Well, now fellows, I didn't like the looks in that fellow's eye, so I told him I was "WA" from Yonkers, who in reality was my friend Runyon from that city. He told me very nicely, "Oh yes, I have heard you

talking to that guy "VN" in Mt. Vernon. If I ever see that lad, believe me, he is going to hear from me. I'd like to have him and that fellow Cannon out to sea somewhere on a nice dark night". There wasn't much doing in the air, so he let me listen in. Much to my sorrow, I heard no other than the other "WA" Runyan working away for all he was worth with Cannon. They were saying how "VN" had a job, and had gone to New York. I told Pickerel there was not much doing in the air, and that I'd tell him if anyone called. Gee! Say I was glad when those two guys got through. I laid the phones down and said "Well, good morning, Mr. Pickerel, I must be going". I thought I'd better get a good head start.

Cannon suddenly felt the need of a large lead-in insulator, and one day he went down to buy it from Mr. Hughes, Superintendent of the United Wireless. The minute he said "I'm Cannon from Mt. Vernon", Hughes had an awful strong desire to call



"I've got a little amateur station—I wonder if you have ever heard it?"

a cop. He told Cannon he could not buy anything from the United Wireless with

all the cash he had. Now it so happened that Cannon's father was more than an ordinary man. Among hundreds of jobs, one of his pet ones was President of the Pacific Coast Company, which was entirely equipped with United Wireless. George, for that is Cannon's first name, went immediately and notified his Dad what Mr. Hughes had said, whereupon Dad called up Mr. Hughes and had a nice little friendly chat with him. When George returned to the office, Mr. Hughes not only wanted to give him the insulator free of charge, but he offered to send a repair man up to install it. Cannon went home with his lead-in all safe and sound.

I made my trip to South America, which was full of thrills as well as the many hundreds of other trips I made. I will not

attempt to describe them here, as I guess I have already taken up enough of everybody's time, and the Editor must have a headache by now. If I have pleased any of you, and I hear from you that you would like to have more, I will at a later date, write again.

I stayed with the United Wireless, until the Marconi Company took it over. They took me with it, and I sometimes think they made a bad bargain, but by that old "stick to it, bulldog grip," I'm still holding on, and here I am today, Manager of one of their largest stations, "WCC", South Wellfleet, Cape Cod, Mass. I have grown very fond of "QST", and I think the Relay League is great. My only advice to you all is "Good luck, and STICK TO IT".



AMATEURS OF PORTLAND, OREGON.

At a meeting held in 325 Morgan Building, on December 15, 1916, the amateurs of Portland organized an association to be known as the Northwest Audion Association. A constitution which had been drawn up previously by a committee was read and accepted. The purpose of the association is to advance and develop the art of radio. To give those who wish it an opportunity to go deeper into the subject. Dues were fixed at twenty-five cents

per month. Any person holding a Government license or who is interested in the art is eligible for membership. Officers were elected for one year. President, Mr. C. L. Austin; 1st Vice-Pres., E. W. Berk; 2nd Vice-Pres., J. M. Hurtt; Sec., P. W. Dann; Treas., Mr. Galyean; Sgt.-at-Arms, B. W. Montgomery; Chief Insp., C. L. Austin. Any persons or clubs wishing to correspond with the Association, may do so through the Secretary, P. W. Dann, 6315—63rd Ave., S. E., Portland, Ore.

The Audion Situation

We are giving below two important letters from the DeForest Radio Telephone and Telegraph Company and the Marconi Wireless Telegraph Company of America. These letters give authorized views of the audion situation.—Editor.

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA.

I have your note of inquiry dated January 25th inst.

You understand that the Marconi Wireless Telegraph Company of America owns the United States Letters Patent issued to John Fleming, No. 803,684, November 7, 1905; that suit was brought against DeForest Radio Telephone & Telegraph Company and resulted in the decision of His Honor Judge Mayer in the Southern District of New York. In his answer in that suit, DeForest set up a dozen of his patents for improvements in detail, among others, two patents covering a third element in grid form located within the vacuum chamber and between the hot and cold element. That is the device bearing the name of "audion." The Marconi Company thought one or both of these patents were good and confessed judgment. Judge Mayer's decision sustained the Fleming patent and found that it was infringed by the so-called three element or audion type. Subsequently, an injunction was issued preventing DeForest from making, selling, or using any vacuum detector, and an injunction was issued upon DeForest's application, preventing the Marconi Company from making, selling, or using valves having three elements within the vacuum, like the audion. The Marconi Company's injunction was modified to allow DeForest to make and sell the audion, provided DeForest gave suitable bond, rendered a periodic statement of goods made or sold, promptly appealed from Judge Mayer's decision, filed the record on appeal before the date set, and perfected the appeal without delay. DeForest made statements for awhile, but failed to comply with the conditions here named and the Marconi Company's injunction immediately became effective.

The situation now is that DeForest cannot make or sell any valves for radio use, and the Marconi Company cannot make the audion.

In this condition of affairs, the Marconi Company has decided to make a valve that does not infringe the DeForest audion patents and that is equally as efficient and that will do anything that the audion does, or is alleged to do. This valve will be placed on the market as soon as arrangements are completed, and will be accessible to amateurs. I am unable to tell you the exact date when the Marconi Company will be ready, but unless some obstacle now unforeseen or unexpected presents itself, the date is not far in the future.

I am send to you, under separate cover, a printed copy of Judge Mayer's decision, for your information.

Yours very truly,

W. B. Vansize,

Patent Attorney.

DeFOREST RADIO TELEPHONE AND TELEGRAPH COMPANY.

Replying to your letter of the 25th inst., regarding the patent situation concerning sale and manufacture of Audions, would state that the injunction of October 9th, issued by the U. S. District Court was restrained later by the Court upon this company furnishing a bond, and also on the understanding that our attorneys would move for preference in the Court of Appeals.

For several months therefore we continued manufacturing and selling this apparatus, but on the 2nd of January our attorneys advised us that in order to gain time so they could more thoroughly pre-

pare their case they would be unable to make the motion for preference, and that the injunction would therefore have to go into effect. Rather than jeopardize a favorable decision for us we preferred to sacrifice a few months sales on this class of apparatus, namely Audion and Ultraudion apparatus.

For the present therefore, we cannot manufacture or sell such goods. This does

not effect the Amplifier bulbs, or the Oscillation Transmitter bulbs.

The case will probably come up before the Court of Appeals towards the end of February, and we hope to get a decision within four or five months.

Very truly yours,

DeForest Radio Tel. & Tel. Co.,
Chas. Gilbert, Treas.

Trunk Lines vs. Any Old Way

By Hiram Percy Maxim

THERE has arisen a doubt in the minds of some of our members of the American Radio Relay League as to whether the writer is or is not in favor of the Trunk Line System of handling relay traffic. This doubt probably arose from an innocent attempt on the part of the writer to overcome a difficulty which was reported by one of the Trunk Line Managers. This difficulty was described as one which arose from the fact that everybody could not be on a Trunk Line. Those good stations which were not on Trunk Lines was said to be growing uneasy because they feared they were being left out. One of the last things we in the American Radio Relay League desire to do, is to have any good amateur acquire the feeling that he is being left out, or that there is any inner circle to which he may not be admitted. Our great aim has been exactly the opposite. We want to so run our A. R. R. L. that every amateur will feel that he is just as much one of us as the President or the Trunk Line Managers or even that highest of all radio celebrities our Secretary himself. But every station could not

possibly be on a Trunk Line, and we must therefore, ask those who are not to try and understand our dilemma and be satisfied with a good position on a branch line. Of the latter, we can have all we want.

The suggestion made by the writer and which he thinks is probably the cause of the doubt which may have arisen, was that if the Trunk Line System which he originally suggested could not be made acceptable to the amateurs generally throughout the country, that he would be willing to give up his idea, although reluctantly. The only other plan which seemed to be able to take the place of Trunk Lines, was one based upon superior station efficiency. If Trunk Lines would not go then some kind of a zigzag line connecting up the most efficient stations would seem to be the only other thing. It now develops that the Trunk Line System is acceptable to everybody, and there is no need for giving it up. Naturally, the writer, the originator of the scheme, is delighted that this is so. He hopes this frank statement of the situation will allay any doubts as to the preference he has for the Trunk Line System.

THE RADIO ASSOCIATION OF WESTERN NEW YORK.

The Radio Association of Western New York has elected these officers: Pres. John G. Rieger; Sec., Edgar C. Steeb; Supervisors, H. I. Goodale, John Haderer and Norman Badina. The name of the club was changed from Radio Association of

Buffalo, to Radio Association of Western New York on account of the large out of town membership. A review of the year's work was given by the retiring President, Albert J. Carver, who predicted a still more prosperous new year. The club expects in a short time to have a room and apparatus of its own.

Professor Taylor at Grand Forks, N. D., Believes in Short Relays

YOUR communication regarding Transcontinental Relay was not received in time to reply before January 11th. Permit me to state, however, that transmission conditions, which I have been observing carefully for a number of years, are, at least in the Northwest, such that consistent work on short wave lengths cannot be done when the stations are 600 miles apart. Amateurs who succeed in making a thousand mile record once a week are entirely too much inclined to think that this proves that they can always reach four or five hundred miles.

When you attempt a transcontinental relay with three or four gaps in the chain which exceed 500 miles, you are taking a long chance; about one in a hundred, I should say. It is not often that transmission conditions are uniformly good throughout the whole continent. They may be good over one stretch of 1000 miles and very poor over another. I should have been very much surprised if your Transcontinental Relay had been a success. I consider the success of some of the other relays which have taken place in the past to have been more or less exceedingly lucky accidents.

You can see that I speak without prejudice, because when it comes to long distance records 9XN is probably as well off as most of them, having succeeded in reaching Vera Cruz, 2100 miles, on 1.7 KW and short wave, several years ago when very poor detectors were supplied to the government sets. It was the battleship Rhode Island which received us. 9XN would hardly attempt to make this record, however, the basis of an estimation of the probable performance of its short wave.

Some amateurs have the idea that because they can usually hear our 500 meter wave, we should always be able to hear them. They forget that we use 5

or 6 KW. and a high aerial and are located, moreover, in a plains country where the waves get an exceedingly good start.

We hear it stated that 9YI is not consistently received in Chicago, although he is closer to Chicago than he is to us. Nevertheless, we are able to receive 9YI even at midday. 9YI has a new 2 KW. quenched spark set. If signals from Chicago were relayed through him and thence to 9TZ, that would ensure their delivery at 9XN.

I realize that the western gaps in your chain are inevitable. You can rely upon us very definitely, however, to get your message as far as Denver, Colorado, or Lewistown, Montana, if you can once get it into our hands. It is not always possible, however, for us to get a repeat back from Denver, and very seldom from Lewistown. We are equipped with the most modern receiving apparatus and have a special regenerative arrangement for receiving short waves. We are therefore very sure that the difficulty lies not with our receiving set. We could not use higher amplification without getting distressing results from the strays.

I think also you are taking a desperate chance in the long jump from Albany to St. Mary's. You perhaps know, however, more about the transmission in that part of the country than I do. I trust therefore that you will bring pressure to bear to fill in other stations between here and 9ZN before the next relay is undertaken. This station is very busy with experimental work, and we dislike very much to waste our time trying for messages which at present can only be expected to get through about once in ten times. If the gap between here and Chicago were a necessary one, I would feel differently about it and would be glad to do our best with 9ZN. With plenty of stations like 9YI and 9YO and 9TZ, who, by the way has a three step amplifier, there is really no ex-

Continued on page 52

Suggestions by M. B. West, 8AEZ

IN my experience as operator of 8AEZ, I have heard so much unnecessary signaling and seen so much confusion result from conditions which can be easily avoided, that a few remarks may not come amiss. I have been as bad an offender as any, but of late it is plain that some order must be secured or amateur work will be seriously handicapped.

First, and I believe worst, is the number of unnecessary calls that are made. It is seldom a station is called unless he is first heard working with another station. Often in taking a message from another station, I have been "busted" completely thru the entire message, by a long call from another station who wished to communicate with me. Only a short time ago, while trying to get a message from 9ABD, I was called by an amateur who made KA seven times, 8AEZ nine times, his own call six times, 8AEZ five more times, his own call four more times, and ARK twice followed by two more K's. And this is not a very unusual case. There are possibly times when long calls are necessary, but they should not be given until short calls have been tried at least once. If you hear 9PC talking to 9ZN and you wish to communicate with 9PC, wait till 9PC stops sending, then put in with a short quick call, so as not to jam 9ZN on the message, at least, and very likely when 9ZN finishes and 9PC again starts to send, he will recognize you and will call you as soon as he has finished with 9ZN. A long call simply "jams" them both, and still further delays the time when it will be possible for 9PC to answer you. If 9ZN is tuned to 200 meters, and your set to 250 or 300, it's no use for you to call 9PC until he has finished with 9ZN, as he cannot hear you if you do call, and you had better wait until he is thru as he will then probably tune to different waves so as to pick up possible calls.

The rules regulating Radio Service as published by the Department, only allow a call to be repeated three times followed

by "DE" and your own call three times. This is not to be transmitted more than three times at intervals of two minutes and then not resumed for fifteen minutes. Just think how much interference would be prevented if only this one rule were followed by amateurs.

It would seem, considering the class of messages usually handled, that a message form similar to the regular Western Union form would be much better for amateur work. The "preliminaries" to some messages are longer than the message itself. Simply HRMSG FM Lima 19th To C. D. Tuska, Hartford, Conn.—. . . —Best wishes for continued success of QST —. . . — M. B. West." If more than one message is to be given the messages should be numbered, but no number is necessary if only one is to be transmitted. Compare this with "Hr MSG Filed 11.15 PM Dec 19th Check 18 Via 8AEZ, 8CS, 2AGJ, 12M From Lima, O. to C D Tuska Hartford Conn, etc., etc." If "fading" is in order the sending station has probably "faded out", by the time "to" is reached, and the whole business has to be gone over again. Also why the "Via?" Every amateur probably knows the route it came over and, if not, and he chooses to think 12M got it direct from 8AEZ, what harm is done?

One of the worst features of amateur message work is the number of repeats necessary. Much of this is caused by the fact that the message is not given to the nearest station which can efficiently handle it, but to the farthest station which can be heard. And again, the bunglesome manner in which the repeats themselves are handled. When "ta . . . — Hartford" would do nicely how often do you hear something like the following. "R R R O K O K except name of party G A name agn etc etc." I notice that most calls for repeat ask for street and number or complete address, which means all before the first —. . . —and not that part following "to." Even if receiving operator reports QSA and QRK it is well to QSZ address

and sig. Again this is simply "Government regulations."

We must not forget the fact that conversation between distant friends is much more important to them than a message from the Mayor of Dallas, Tex. to President Wilson or a "Best regards via wireless from Alice." Amateurs will usually stand by patiently as long as reasonably efficient relaying is being done, but when messages are repeated time after time (again "regulations" only allow three repeats) and much time is lost thru poor operating and unnecessary signalling, patience is soon exhausted and QRM results. Conversation cuts thru more QRM and covers longer distances than the "Presidential Relay" message sent by a 5 KW set.

In these times of sensitive receiving sets QRM is caused by stations many miles away, and a little more consideration will go far to relieve things. Also a little

thought as to how conversation is worded will frequently cut down the number of words more than half. Also, while courtesy is much to be desired, I know we have all often felt that it takes too long to say "good bye." Why C U L if you do not intend to try again the same evening? Why the oft repeated assurance that you will be glad to handle any message, etc, etc? I have never yet heard an amateur refuse a message he could handle. Why not simply "73 G N . . .—," and not even go back if the other fellow wants to prolong the "agony?"

If a few of the more prominent amateur stations would adhere strictly to these or similar rules, the example would go farther towards eliminating unnecessary signalling than any attempt to regulate the traffic. I really believe that if we do not attempt to "regulate" ourselves, that the Government will do the regulating and it may not be to our liking at all.

Don't Miss This One!

Mr. A. L. Groves of Brooke, Va., writes: "I have just about finished reading my first copy of QST received a few days ago, and am very much pleased with it, as it seems to be a magazine for the amateurs entirely and not mixed up with corporation stuff.

Several of the points taken by writers impress me very much in their thoroughness and homelike method of expressions.

I am located way down in ye-ole-Virginny about 45 miles from nowhere so far as wireless is concerned, and consequently have little or no opportunity to get in personal touch with anyone who is interested in wireless. I have made several attempts to get some fellows around here interested, but to no avail, and it does me good to read a magazine with the personal element so prevalent.

I have no transmitting apparatus, for the simple reason that it is impossible to get any juice around this one horse place and, as stated before, as there are no amateurs nearer than about 45 miles (Washington, D. C.,) it would be about

useless to put in a spark coil set.

When it comes to receiving I have most of my city friends beat, as I have room, and then some more, to erect any kind of an aerial I want up to half a mile long. The aerial I now use is about 600 feet long and composed of 6 wires spaced 13 feet apart at one end and about 3¼ feet at the other. This aerial is getting on the bum now and I have got to put up new poles. I have about completed arrangements for the new aerial and want to get it up in a few weeks. It will be something like 750 to 800 feet long and about 95 to 100 feet high. Do not know the exact measurements until I get at it, but this will be approximately the dimensions, and I expect I will be able to do somewhat better work with it than I do now with my 600 footer about 80 feet high. It may be of interest to you to know that I once tried an aerial about 1,200 feet long composed of three wires and could not do very satisfactory work with it. It was only a temporary or experimental affair and about 70 feet high at its highest point.

I only kept it up part of one day but couldn't do as well with it as on a much shorter aerial.

The article, "Radio Survey," by Mr. Smith touches upon a subject that I have pondered over considerably, and that is, the ability of an operator to hear a station or several of them several hundred miles away and cannot get in touch with another only 50 to 100 miles away. Personally I DO NOT believe in the theory of refraction or reflection touched upon by Mr. Smith, but it is a fact nevertheless that stations at a considerable distance apart can maintain communication much more satisfactorily than those close together. I have made numerous experiments along this line, and it seems that by far the greatest number of amateur stations that are heard range between 250 and 600 miles. Up to 250 miles they are scattering, and over about 600 miles they thin out again until about 900 to 1,000 miles, and only a very few are heard over 1,000 miles. This leads me to the conclusion that the amateur wave is more suited to distances of 250 to 600 miles than other distances. This for night work only, and even stations which can work each other fairly satisfactory in the day time, cannot work with each other at night without difficulty on account of the QRM from distant stations. This rule also applies to the commercial stations operating on 600 meters, as stations which are continually heard during the day are completely drowned out by other 600 meter stations at distances of 800 to 1,200 miles or thereabout, at night, and this leads me to the conclusion that the 600 meter wave is most effective at a distance of approximately 900 to 1,000 miles at night, or taking a little broader view at distances of from 800 to 1,200 miles as mentioned before. A little listening by anyone with a fairly efficient receiving set will quickly prove the above statements. This does not apply to exceptionally nearby stations of course, but if your commercial daylight station is from 75 to 100 miles, or further, the night commercial station located between the above mentioned distances will drown the daylight station out nearly every time.

The point in Mr. Smith's article regarding the amateur reception of signals at

right angles with the aerial is also well taken, and this is also the experience of yours truly,—although from the map published with Mr. Smith's article, I seem to have better success in other directions than he does. His map I understand, is based upon sending while my experiences are for receiving only.

Dr. Radio gives the straight dope about ground connection, and I may add that it certainly is the Little Things in wireless that count. These little things mentioned by Dr. Radio should be taken seriously by all amateurs who are real enthusiasts for a little added ground will certainly help, and this ground should be added until there is absolutely no increase in strength of signals and then add some more after that. This helps remarkably in receiving as well as transmitting, and I may add that as far as possible, all experimenting in receiving should be done in the day time as then signals are more steady from the transmitting station and the operator can better judge if his experimenting is improving his set's efficiency. All testing should also be done on the weakest signals possible as any increase or decrease in strength is easier to note than where the signals are loud.

Your editorial "Early Morning Work" apparently written as a joke, is a question I have often asked myself. I have to get up around about 5:15 A. M. to do a little work and get to my work as Operator at 8:00 A. M., and if I have time I do a little listening in, but I have never yet heard an amateur on at this hour of the morning. As a rule QRN is taking a nap as you say, in the early morning, and it also gives the fellows in the East a chance to hear a whole lot they cannot hear in the first part of the night. It is seldom indeed that I listen in after 9:00 to 9:30 P. M. QRN is at its worst the first part of the night, as a rule, and it worries me very much personally. Stations in Europe can be heard better during this part of the night as it is night all way across, but for the Pacific stations, Hawaii, Alaska, and even further, the early morning, about daylight or a little before sunrise, is THE time to listen in for these. Of course they can be heard at other times but not half so well.

"I believe there are hundreds of amateurs in the east who never heard a station on the Pacific Coast who could hear them easily if they listened about the time suggested. Many more can hear the Marconi and Federal stations in Hawaii (KIE and KHK) at this time, who cannot hear them the first part of the night, and last but not least, the Marconi Station in Japan (JJC) can only be heard about this time by those in the east, except probably under the most favorable conditions. It is indeed interesting to hear these high power stations get together and use the break in system. KET, KIE, JJC, MFT, and VGB all have this break in system down pat and use it to good advantage. The fellow who has not his station equipped so he can hear these high power stations is missing two-thirds of the Radio Game.

One thing that I do not understand is, so much talk about these long distance arc stations, and very little is said about the long distance spark stations. Is it that very few amateurs can hear these spark stations, or is it considered a greater feat to hear the arc stations? We hear a fellow say he can hear NBA or OUI or NPL etc., but very seldom hear of anyone saying anything about MFT, VGB, FL, LP, UCJ, KET, KIE, JJC and many others. Long Distance in Fact, on page 44, was hitting them up pretty lively with his galena detector when he copied JJC with it, but I have no doubt that he did it all right as these stations are very powerful, and although I have not copied JJC with galena, I can copy KIE fine with galena, as well as several spark stations in Europe, of which MFT is the best, being heard occasionally with galena loud enough to raise receivers a foot or more from my ears in daylight, but this is exceptional, and is about as well as the audion will bring it in under ordinary conditions. In the above article, I notice 6EA hears KSS arc signals with his galena. I have never heard but one discussion in any magazine about hearing arc signals with galena, and that was before arc stations came into general use, and it seems that this particular magazine was very doubtful that this could be done, unless the arc station was very close to the receiver. Since arc sta-

tions have come into general use, it is now in fact, an almost constant occurrence to hear these stations with galena, or, any crystal detector. It seems that two arc stations have to be working on nearly the same wave and this gives the beats and produces a tone exactly like that received by the audion. Sometime only the compensating wave can be heard, and signals are of course unreadable, but about as often the true wave can be heard, and I have copied signals from nearly every arc station within about 2,000 miles of here in this method, and the first and longest distant station I ever copied in this manner was KSS, although I can hear OUI in this manner occasionally, but not satisfactory enough to term in the copying class.

This is sure a QRM issue all right, and noting the complaints of many operators about QRM, it occurs to me, if you could possibly get the Government officials interested enough in this relay work to amend the laws so as to include a certain number of relay stations in a special class, something on the order of the now "X" "Y" and "Z" class stations, allowing them to use 425 meters for about three hours each evening, say from 8:00 P. M., to 11:00 P. M., and require them to STD BI three minutes every quarter hour, to see if they are causing QRM to commercials. It might be added that no license for such a station would be granted to any one within about 25 miles of a Government or Commercial Station, and require them to state exactly which relay stations they would communicate with. Let each of these Relay Stations be on the job at the hours specified as much as possible and obey the law, and I believe most of the QRM will be done away with, so far as the relay work is concerned. Then if we want to indulge in such stuff as illustrated by The Old Man, let us get back to the 200 meter wave for that.

Well, I started in to write a little note of appreciation of your magazine, but it seems I am making a long letter of it. There are a lot of subjects I would like to discuss, but will cut this out now and perhaps let you hear further from me. Thanking you very much, for your good work, I am,"

A. L. Groves.

Department of Defence

By Edgar Felix

ANNOUNCEMENT.

THE Department of Defence of the American Radio Relay League will soon demonstrate to such departments of the United States Government as can avail themselves of relay service in time of difficulty just what we can do.

Official messages will be relayed for Government Departments as soon as arrangements can be made by trunk line managers to take care of them. These messages will be in code and will be similar to those that must be handled by the league in time of emergency.

The success of these test messages will determine whether the League will be closed down in time of war, or whether we can be of real help. Let us all get together and send them through on schedule and without errors. Your manager will communicate with you when the time comes. Your duty is to be prepared and to be right on the job when required.

DEPENDABILITY OF THE TRUNK STATIONS.

Many of you who desire to be on trunk lines having a range over three hundred miles have been refused appointment. The chief reason for such refusals has been lack of dependability.

Lack of dependability is the result of one of two conditions: First, you work long distances regularly but are 'on' irregularly; or, second, you are 'on' regularly but work long distances only irregularly.

A station of the first kind may be—but only may be—of great value in defense, but one of the second kind will be of no value.

WHY SOME STATIONS FAIL.

Several factors contribute toward making a well equipped station's work irregular and uncertain; First, too many un-

necessary and valueless experiments and adjustments; second, magnetic and atmospheric conditions; third, local QRM.

THE EXPERIMENTER.

The first factor —hap-hazard experiments and adjustments (not improvements) for no definite purpose, can be remedied only by the operator remedying himself.

If you happen to be one of those operators afflicted, even only slightly afflicted, with St. Vitus' Dance of radio experiments, the first thing is to get yourself under control so that you will conduct your experiments for a definite purpose, looking forward to a definite end.

Most experiments are not based on careful forethought. The experiment is made first and the thinking is done afterward. Reverse the process, and you will accomplish more; your station will be of use in co-operating with others.

Just realize that the stations doing the best relay work use the simplest apparatus and the simplest circuits. All other apparatus is superfluous.

SOME MODEL EXPERIMENTS.

Some time ago one of the most prominent amateur in this vicinity received a letter from an enthusiastic westerner offering to forward a circuit requiring but one audion bulb that would be a world beater. He claimed it brought in numerous stations with such incredible loudness that it was almost impossible to stay in the room because of the deafening noise; he claimed that it carried as far as "the sound of a phonograph on a still night in the open country."

Another amateur states that squirting a little lemon juice on the surface of a galena detector produces annoying amplification of signals "due doubtless to some electrolytic effect."

Simplicity of design and conformance to sound principle brings good results; haphazard experiments based on hearsay leads to failure.

ATMOSPHERIC CONDITIONS.

Atmospheric conditions are not so easily disposed of. They form a particularly difficult problem as we have no good explanation of their cause. Read what 8NH had to say regarding last month's transcontinental relay.

The negative freaks are of various kinds: first, general fading from certain geographical directions; second, fading of particular stations; third, swinging—alternate fading and strengthening.

First, as to general fading, covering a large district, such as described in the last month's QST: Accurate information regarding such fading or swinging is of great value. Only by having all the facts will there be any possibility of really explaining them. It lies beyond the field of radio science (in the realm of meteorology and in the study of the magnetic field of the earth).

Second, as to fading and swinging of particular stations. The fault sometimes lies within the transmitting station itself. Weak connections, resistance of aerial changing as it swings in the wind, variation of load or speed of source of power, increased resistance of conductors due to heat, arcing of rotary after heating of electrodes, etc.

If close-by stations report that your signals swing, make a careful analysis of your station.

LONG DISTANCE FREAKS.

Freaks work both ways. Some of them, although reported on good authority are hard to believe. Cape May (WCY) is much more difficult to hear in New York than Miami (WST) although the latter is 900 miles further away. The normal working range of Cape May is 125 miles, yet this station is frequently heard both day and night at a certain point off the coast of Venezuela almost 2,000 miles away.

Several years ago Boston (WBF) worked a ship nearing the Coast of Japan, a

distance of about 8,000 miles.

An amateur in New York City is reported to have worked a station in Denver, and the same night heard a station in California, all three stations using but one kilowatt of power.

OVERCOMING QRM.

Selective apparatus built on modern principles does not fully meet this problem.

The 'little boy with the spark coil' is one of the chief disturbers. Diplomacy accomplishes more than threats with him—sometimes. Get his name and address first. When he asks how his friend around the corner is getting him, give him a QRA. Then such malicious interference as was described editorially in last month's QST cannot be repeated. Keep a record of all close-by stations as to location, ownership, etc.

Invite the worst offender in your vicinity up to your station once in a while and try to show him that good will and consideration will help all concerned. If you give him a clear field once in a while, he will do the same for you.

RADIO CLUBS.

Another very potent agency in dealing with the QRM problem is the radio club. In a recent conversation with Mr. Hebert, he told me of the work of the Radio Club of Baltimore. QRM was as serious a problem in Baltimore as it is in New York. But now after a certain hour, due to the good influence of the Club, the boy with the spark coil gives the relayers a chance.

The influence of a large organization which embraces a good proportion of local amateurs can do as much as a complete boycott of persistent offenders.

The radio law applies to amateur as well as commercial stations and anyone who persistently and willfully interferes with relay work should be reported by the local organization; not by an individual. Decency demands regard for the other fellow and long conversations on a broad wave is as objectionable as an intoxicated man at a prayer meeting.

The Radio Club of Baltimore reports all

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AFFILIATING THE CLUBS

Why do we not affiliate all the different Radio Clubs throughout the country? There are hundreds of them. Hardly a city large enough to be called a city, is without either some little group of amateur radio enthusiasts who get together every so often or a real live Club with regular places of meeting and regular officers. All of these groups have the one interest and this interest is never local, because every wireless enthusiast wants to work distant places. There would seem to be every reason why everybody's interests would be furthered by all of the clubs becoming affiliated and the way made easy for them to pool their different problems.

If all of the Radio Clubs of the country were linked together in one pool, it would clear the way for improved relay traffic and reduce the difficulties of those trying to organize relay routes. The different Clubs would possess that local information which any route manager must have in order to provide working routes. Therefore, the placing of all of the Clubs of the country where they could co-operate with traffic organizers, would be a tremendously helpful thing. As our American Radio Relay League is the natural organization to handle countrywide relay traffic, it would seem to be the natural nucleus around which the different Clubs should affiliate.

This matter has been the subject of discussion here at Headquarters for some time, but action of some kind has been put off for some reason or another. The fre-

quent complaints that the regular routes cannot be depended upon when messages are awaiting transmission, makes us feel that the matter should not be longer delayed. Nothing would so quickly improve the reliability of the regular routes which our Trunk Line Managers have organized as placing at the disposal of the latter the facilities of the different Radio Clubs of the country.

The first step in affiliating the various Clubs is to establish a directory of them. With this and information regarding the number of members and names and addresses of their various Secretaries, it becomes possible for everybody to see just where everybody else stands. Subsequent action with a view to developing the working plans would come to the surface automatically. Our Trunk Line Managers and our various district Superintendents, with their well-known capacities for hard work could be depended upon to start things in the proper direction. In order to give the thing a start, we say right here, let every Secretary of every Radio Club send in the name of his Club, the number of members, the number who hold First Grade Commercial Licenses, the number who have good transmitting and receiving stations, and their own name and address. When enough response to this appeal is made, we will arrange a department in QST devoted to affiliated Radio Clubs. The added expense will be the added cost of printing and this distributed over the various Clubs will amount to a very small sum a year.

This puts it up to you, Mr. Secretary of the various Radio Clubs of the country. Get busy, send in your data right away, and

let us see what an interesting thing we can make out of it.

FOLLOW THE ROUTES

Our hard working Trunk Line Managers are beginning to show signs of brush discharge. One in particular has a distinctly blue halo surrounding him, when he gets on the subject of relay traffic not following the routes he has labored so long and hard to organize. We are told by some who have come within range that there is also a strong odor of ozone. This means brush discharge as sure as shooting.

The trouble is that a lot of us are entering the relay traffic and have overlooked the necessity for following regular routes. It is not appreciated probably, that jumping around and sending a message from Buffalo to Detroit by way of Albany and Chicago, is demoralizing to an orderly and systematic handling of business. No doubt a brief reminder will be all that is necessary PROVIDED it is possible to get a station on the regular route to answer. We have a lurking fear that some of the irregular routing of messages is because of inability to follow the regular routes. This, of course, suggests that those stations lying on the principal routes ought to be on the job a little more efficiently.

We thought we heard something in the air one night recently which suggested that Mr. Hebert was doing something in the line of laying out regular time schedules, probably with a view to improving the chances of overcoming the trouble of failure to connect up on regular routes when traffic is

offering itself. We have not heard from him on this point directly up to this writing but we no doubt shall in due course. The scheme is unquestionably a mighty good one. It is discouraging to any station to be on constantly and get nothing and then the first time a night off is taken, to have it come out later that the night off was the one night that he should have been on. If definite hours are set for being on, it avoids all of this. It is something which all assistant managers and District Superintendents should think about. The traffic we are asked to handle is growing at an ever increasing rate, and we must handle it in a systematic and orderly manner if it is to be efficient. If, as is the case in many parts of the country, there is no one acting as District Superintendent, let any one of us who is on some regular route take the matter up himself with his neighboring stations and arrange for regular hours and dates when everybody will make a point of being on and ready to clear traffic. The Trunk Line Managers will develop material for District Superintendents in this way. It is in fact, the only way this material can be developed, because our District Managers cover very large territories, and they have no means of knowing who to ask to help them out. Come forward, you fellows who want to take a hand in the good work and help the cause of system and efficiency.

WORTH FIFTEEN CENTS

When you have to decide between price and quality, it certainly does wrench you. However, it always ends one way if you have the price, or think there is a fair chance that it is attainable. Well, that's us. We have sat and stewed over making both ends meet with this magazine of ours, and we have to decide between quality and price. We say quality. You other fellows certainly have the price. We know you have it because it's only a nickel a throw more. Therefore, commencing

April first, and by the way that is April Fool's Day, and what do you know about that, the price of QST will be fifteen cents a copy. All subscriptions in before that date go at the old price, but everything after that date costs \$1.50 a year or 75c. for six months. We hope you will back us up. We certainly need it.

If you will notice, we have been going up and up on the number of pages, and we have the most interesting kind of stuff coming to us in such a flood that we want

to keep on going up. If we had the price, we could print a magazine which would make you sit back and water at the mouth between issues. It is simply wonderful.

We want to print this stuff, and with more money, we can do it. We know you will feel it is well worth another five cents.

"THE LITTLE BOY WITH THE SPARK COIL"

Take warning, you big fellows with your one K. W. and plus. You have in your writings prodded the spark coil too deeply and too frequently, and the worm has at last turned. The frequent references in the columns of our QST to the spark coil and its youthful operator have brought in many remonstrances to the effect that the spark coil is not such a poor miserable piece of apparatus as it is painted and those who operate them are not all still nursing a bottle. Instances are given by all these remonstrants. Cases are cited where the distance over which accurate and regular communication is held, is many times more efficient per watt of energy used, than the best of our transformer stations. Some of the important relay traffic is evidently entirely dependent upon the spark coil.

For our share in this thoughtless aspersions of the spark coil, we apologize in public and in print. We realize the truth in the contention that the spark coil is not to be always viewed with contempt. Probably our several writers will take this same view of the matter. The grieved ones may therefore take it for granted that we are sorry our jokes became rough

and caused their feelings to be injured.

But there still remains the other member of the duet—"the little boy." We hardly dare place ourselves on record after our experience with the spark coil. We know from a profane experience extending over some years that somebody, age not specified, has caused in the past, and is causing in the present, untold misery on account of unnecessary noises made from spark coils. For some reason or other, we have assumed that the age of the delinquents has been of tender years. Possibly we are wrong. But, whatever his age, we have a certain something we are holding for him and when the opportunity presents itself, he will fully realize the suffering and disappointment he has caused. Many a good message has been killed on account of him and his thoughtless scratchings.

To the little boy, however, who is well behaved after nine p. m., and the spark coil who is always well behaved if the vibrator is kept clean, we extend the glad hand of fellowship. All of us were once little boys ourselves, many of us are little boys yet, and practically all of us had our whack at the spark coil before we got there, in radio.

THE GREAT UNWRITTEN LAW

Why not observe the unwritten law of amateur wireless all over the country, instead of in only certain parts of it. In many sections it has already come to be strictly followed, and the "big fellows" and the "little fellows" are able to live in harmony with each other. This law is written down in no book, and no District Radio Inspector will give it official recognition. But every one of the nine will quote it in settling quarrels between us. Here it is, and let every one learn it and observe it:—

AFTER 9:00 P. M. AND UNTIL 7:00 A. M., LOCAL TIME, THERE SHALL BE

NO SMALL TALK, CONVERSATION, TESTING, NO OTHER UNNECESSARY INTERFERENCE WITH LONG DISTANCE TRAFFIC.

BEFORE 9:00 P. M. AND AFTER 7:00 A. M. LOCAL TIME, FREE FOR ALL SMALL TALK, CONVERSATION, TESTING, ETC. SHALL HAVE THE AIR TO ITSELF, AND LONG DISTANCE TRAFFIC WILL KEEP OUT.

Let us all encourage the observance of this primitive and simple regulation. It will do much to promote the interests of amateur wireless.

TRANSMITTING EFFICIENCY

If the Government came along some fine afternoon and decided to find out what we amateurs averaged in the way of transmitting efficiency, what do you suppose would be the opinion of the investigating officer when he arrived at the final figure? It would be unfit to print, we will bet a regenerative receiver to a short circuited transformer. Efficiency means the ratio of the output to the input and it is usually expressed in per cent. We wonder if the average efficiency of one hundred representative amateur transmitting sets would be as high as 25%. The trouble is that we have to put together our own transmitting outfits, whereas, we go and buy the essentials of our receiving sets. Then again, the transmitting problem is an altogether more complex one to master.

Where does this lost 75% go? A certain amount goes in our transformer. Where the transformer is purchased of a good builder, and most of our transformers are, the efficiency is probably 95%, and the loss only a small one. What about the condenser? Losses here probably run to all kinds of figures because not only of the difficulty in getting a metallic coating on the glass properly, but also on account of the lack of understanding regarding the amount of condenser capacity that should be used. Next comes the oscillation transformer. Who knows where the average amateur oscillation transformer gets off on the question of efficiency? We have seen in different amateur stations every conceivable kind of an oscillation transformer. We have seen coupling as

close as the construction would permit the two coils to come and we have seen coupling of the order of twelve inches. One thing we have not seen is any record of efficiency tests on oscillation transformers of the type we amateurs use. What about leads? Everybody says, make them short. Most of us have them long. What about ground contact? How much does the average amateur lose because of insufficient ground? From our observations and what eminent authority has told us in the pages of our QST, we should judge that a tremendous loss occurred here.

We wonder if we amateurs are not sadly in need of some new type of transmitting apparatus which will make it easy for us to obtain a sharp wave and a low decrement and an over-all efficiency that is respectable. The new impulse excitation looks promising for our service. As far as known, no amateurs have gone into this idea. If some manufacturer would come along with something of this order or its equivalent, and which would give us good transmitting efficiency, he would be swamped with business, or we are very much mistaken. The limitations of 200 meters and one kilowatt input, are a handicap which makes our problem a different one from the usual commercial problem. It is our habit to howl about our 200 meter wave length, but it can be made to do good long distance work if the efficiency is what it should be. Keep this question before you, fellow amateurs, and manufacturers.

CALLS WHICH HAVE BEEN HEARD

We want an expression of opinion from everybody on the subject of whether or not we shall continue to print lists of call letters which have been heard by different stations. These lists are sent in to us every day in the week and we have many more than we can print with our present limited number of pages. We have already started using fine type for them as you may have noticed. There is a difference of opinion here at Headquart-

ers as to whether these lists are worth printing or not. As we are trying to run this magazine to suit you fellows throughout the country, we want you to come across with a post card within the next day or two after reading these lines and state on said card your opinion on this point. Write a letter if you feel that way inclined. We love to get them.

And by the way, consider whether we shall ask stations to limit themselves to

call letters of stations one hundred miles or more away. Say what you think about this. And, let everybody who sends in

call letters, arrange them in numerical and alphabetical order. It helps everybody.

WAR?

We wonder several times a day, what the effect upon amateur wireless would be if this country drifts into war. When the European war first broke out, a lot of us on the Pacific coast were compelled to shut up. Later on, we took this matter up with the Commissioner of Navigation on one of our visits to Washington, and the latter official was good enough to look into the matter. He found that after several months of closing down of the amateurs, the cause for the order had been removed, and the stations were permitted to reopen. If we were to have war at the present time on our own account, it is one of the serious questions with us as to whether or not we would be allowed to go on as we are now. Military necessity is one of

those things which does not have to explain its actions. We certainly hope that we shall be successful in showing the authorities that we are sufficiently well organized to make it a military advantage to keep us going. We might be of quite a good deal of assistance in detecting unneutral use of wireless. We would take a long chance that the vast majority of us would be strictly loyal to our country, and would observe the President's neutrality proclamation, which is still in force. With one thousand loyal amateurs listening in every night along our coasts, the chances of one or two unloyal operators would be pretty small. Without us, the Navy would lose these one thousand pairs of listening ears.

GREENSBORO RADIO CLUB.

The Greensboro Radio Club was organized July 17, 1916. At present it has a membership of eighteen. They have no permanent quarters now but are planning to get a room in the local Y. M. C. A. A series of lectures have been given on electricity and magnetism as well as various demonstrations for fellow amateurs. The officers are; Pres. Osmand Pate; Vice-Pres., George Eichorn; Corresponding Sec., James Hendrix; Sec.-Treas., Roy Enoch; Inspector, Dwight Clapp. All communications should be addressed to James Hendrix, 803 Church St., Greensboro, N. C.

NASHVILLE (TENN.) RADIO CLUB.

The Nashville (Tenn.) Radio Club has been recently organized, and is in a flourishing condition. The officers are: President

S. H. Sheib; Vice President, V. M. Thompson; Secretary and Treasurer, W. H. Wade; Official Operator, T. L. Parkes.

Nashville, while late in starting amateur radio work, has installed a dozen stations in the past year, and may soon be counted on to fill in one or more of the gaps in the relay routes. With no other amateur stations closer than two hundred miles, local interference has made long distance work next to impossible, but the good efforts of the Club are already felt, and conditions have improved to a remarkable degree. A movement now on foot to confine the work of small sets to the early hours of the evening, and that of the larger sets, to the later hours, (after 9:00 p. m.) promises welcome relief.

Communications should be addressed to W. H. Wade, Sec'y.—Treas., 719 Fatherland, St., Nashville, Tenn.

WHO'S WHO IN AMATEUR WIRELESS

We shall publish each month two pictures of amateurs who have become known by call letters. This will draw us all closer together. We are often curious as to just what the other fellow looks like, and here's our chance to see.—Editor



GERARD WILSON.

6AGW.

Gerard Wilson of San Jose, California, is neither the namesake of the United States ambassador to Germany, nor a relative of our nation's Chief executive, but he surely is one of the closest friends of "Old Man Radio," as evidenced by his speedy rise in the amateur radio world.

"Babe" Wilson has been actively engaged in amateur wireless during the present relaying season. Although he has been interested in the wireless game but eighteen months and is only sixteen years of age, he is the equal of a ham gaining five years of experience by hard luck. He gained his first knowledge of wireless from several experienced "Old Timers"

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GEORGE D. BAUER.

9VY.

The spark of 9VY extends over an area which covers a good-sized part of the United States. His friends will indeed be glad to see the operator and here he is. Mr. Bauer got his start when he was going to High School in Fort Wayne, Indiana. Once bitten with the "bug," he was obliged to go through the "spark coil stage;" he followed this up with a quarter kilowatt transformer; then the audion came and you probably know the rest. The best transmitting done by 9VY was to 6DM in Phoenix, Arizona, about 1,600 miles. Mr. Bauer is high in his praise of QST and gives it credit for a great deal of his success.



REPORT OF JANUARY TESTS.

On Dec. 28, 1916, the relay test msg. was received by 6KU (Walnut Grove, near Sacramento), 6CR (Fullerton), and 6FT (Stanford University, Calif.) direct from 6EA (Los Angeles), when same was broadcasted QST. 6KU broadcasted msg. 6AV (Reno, Nevada) will not be on duty until Jan. 8th as he has come to California for Xmas.

For Dec. 31, 1916, 6FT received relay msg. direct from 6EA, when same was QST'd. He QSR'd same to 6BJ (Centerville), who sent it to 6SC (San Francisco), also tried to raise KDP (Portland) up to 1 A. M., but without results. 6SC copied first part of msg. from 6EA direct, but "sigs." faded and had to get last part from 6BJ.

Thurs. Jan. 4th, 1917.

Sent usual "QRT and QRX"—QST at 9:50 P. M., for relay msg. at 10:15 P. M.—Called 6AAG, 6RG, and 6ZW but local QRM too bad to hear any relayers. Later on, sent relay msg. ("Do your best at relaying.") to and QSL'd by 6AAG (Pomona), who tried to get same to 6RG and 6DM, but without success. 6BY (Richmond) calls and says to 6EA, "ND—to-nite—QRM." Worked and got QSL on relay msg. from 6CR and 6RG (San Diego). QST'd same several times. 6FT and 6HO were unable to get test msg. on account of "QRM."

Sun., Jan. 7th, 1917.

Sent test msg. ("Relay far as you can.") to and QSL'd by 6AAG, who sent same to 6RG and 6CR. Transmitted msg. to and QSL'd by 6FT and 6BV (Redlands). 6KU received msg. from 6EA direct. 6FT QSR'd same to 6BJ. 6AU (San Jose) got msg. from 6FT and 6BJ. "JS" (Lodi)

got msg. from 6VG (Walnut Grove). 7Lr (Portland, Oregon) copied relay from 6BJ, when it was QST'd at 12:20 A. M. He broadcasted same at 12:25 A. M. 6HH in Sacramento received msg. from "JS."

Thurs., Jan. 11th, 1917.

Sent test msg. ("Radio greetings from Los Angeles") to 6BY, 6BJ, and 6CR. 6KU copied msg. from 6EA direct. 7YS (Lacey, Wash.) and 7ZN (Vancouver, Wash.) copied the relay msg. direct from 6BY, when he QST'd it.

Sun., Jan. 14th, 1917.

6EA sent test msg. ("Get the next station quickly") direct to 6ZW who relayed it to 6FT. 6AU, 6PW, (Coyote, Ca.) and 6OK gave 6EA, QSL on relay msg. 6CR, 6RG, 6KU, and 6FT copied the msg. direct from 6EA. 6FT QSR'd same at once to 6BJ, and also to 6SH on Monday. 6EA sent relay test msg. direct to 9ZF (Denver, Colorado), who relayed same to 5DU (Dallas, Texas), who also promptly sent same on its way rejoicing via 9ABD, thence to 9ZN (9IK). (Chicago). Latter one got it from 5DU direct.

Thurs., Jan., 18, 1917.

6EA sent test msg. ("Get the next perfect relay.") direct to 6BY, 6BJ, and 6AC, who broadcasted same to 7LF and KDP. 6HH, 6KU, 6FT, and 6RG copied test msg. from 6EA direct.

Sun., Jan., 21st, 1917.

6EA sent test msg. ("Never fail to be on duty.") direct to 6RG. 6OK got QSL on test msg. from 6CR. 6BJ and 6KU copied msg. from 6EA direct. 6FT got said msg. on Monday. 6HH and "SAC" (Sacramento) got same from 6KU, and "shot it blind" to KDP and 7YS.

Thurs., Jan., 25th, 1917.

6EA sent relay test msg. ("Send this message far as you can.") direct to 9ZF who relayed same to 9XM (Madison, Wis.) 7DQ (Portland, Oreg.) copied relay msg. direct from 6EA, and relayed same to 7ZN, who broadcasted it, as 7YS wasn't on duty. An hour later, 6ABR and 6KU sent same to 7ZN. 6ABR sent msg. to 6KU and 6AU. 6RA (Sacramento) received msg. from 6KU.

Sun., Jan., 28th, 1917.

6EA sent relay test msg. ("Let us be the first and only relay.") direct to 7ZN

(Vancouver, Wash.) 6KU, and 6JZ (Berkeley) copied msg. from 6ABR. Broadcasted test msg., which was received by 6CR.

On Monday night, 6EA sent Sunday's relay msg. direct to 9ZF.

Seefred Bros., Trunk Line Managers,
343 South Fremont Ave.,
Los Angeles, Calif.

Following is line-up of relay stations on Trunk Lines—B, F, and H.

Trunk Line "B"

LOS ANGELES, CAL.
6EA
RICHFIELD, UTAH
6AL
SALT LAKE CITY, UTAH
6ZV (Branch off)
BOISE, IDAHO.
7ZR (Branch off)
DENVER, COLO.
9ZF and 9AMT.
COLORADO SPRINGS, COLO.
KIY

From Jefferson City, Mo., up to Denver, Colo., is route developed by Mr. S. Kruse, our assistant manager on Trunk Line "B."

JEFFERSON CITY, MO.

9ABD
KANSAS CITY, MO.
9EP and 9MQ
LAWRENCE, KANS.
9LQ.

LINCOLN, NEBR.

"SN"
DENVER, COLO.
9ZF.

Alternate (preferable route)
LAWRENCE KANS.

9DM.
DENVER COLO.
9AMT.

The following stations are on branch lines.

BRANCH NO. 1.

9ALS—Leavenworth, Kans. works with 9EP or 9LQ.

BRANCH NO. 2.

9IO Bennington, Kans. to 9YV Man-

hattan, Kans. to 9JW—Topeka, Kans. or 9DM—Lawrence, Kans.

TRUNK LINE "F"

SAN DIEGO, CAL.
6RG.
FULLERTON, CAL.
6CR
LOS ANGELES, CAL.
6EA.
SAN JOSE, CAL.
6AU
STANFORD UNIVERSITY, CAL.
6FT.
CENTERVILLE, CAL.
6BJ
RICHMOND, CAL.
6BY
LODI, CAL.
"JS"
ACAMPO, CAL.
6PN
IONE, CAL.
6RJ
SACRAMENTO, CAL.
6HH, 6RA, and "SAC"
RENO, NEV.
6AV and 6NL
PORTLAND, ORE.
7LF, 7AF, 7DQ, and 7PD.
VANCOUVER, WASH.
7ZN.
LACEY, WASH.
7YS.
HOQUIAM, WASH.
7DJ.

TRUNK LINE "H"

LOS ANGELES, CAL.
6EA
REDLANDS, CAL.
6BV
PHOENIX, ARIZ.
6DM
DALLAS, TEXAS.
5DU and 5ZC.
KANSAS CITY, MO.
9MQ, 9EP.
JEFFERSON CITY, MO.
9ABD

Seefred Bros.
343 South Fremont Ave.,
Los Angeles, Cal.

"LONG DISTANCE TRANSMITTING."

By H. C. Seefred, 6EA.

On Sunday January 14th, after midnight, station 6EA established communication with 9ZF in Denver, Colorado, 850 miles from Los Angeles. He reported its signals QSA. Have communicated with him almost every night, handling 21 messages already. 9ZF relayed all of 6EA's messages to 9ABD (Jefferson City, Mo.), and 9XM (Madison, Wis.) direct, making a total of approximately 1,700 miles that 9ZF covers as a relay station from coast to coast, and nearly two thirds of the whole distance, which is more by far than any other station has to do, and I think Mr. Doig, the operator, should be given special credit in the relay work in closing such a long gap between the middle states and the western coast. 9ZF had been hearing 6EA every night before he got in touch with him. He is heard almost every night by 6EA and his signals are strong.

6EA also established communication with 7ZN in Vancouver, Washington, 875 miles from Los Angeles, on the night of Sunday, January 28th, and has sent three messages to him already, one being from Denver to Portland. As it is now, we have a perfect relay from 9XM or 9ABD via 9ZF via 6EA to 7ZN, which is over two thousand miles long. And from 9ABD or 9XM to the east coast via 9ZN via 8AEZ or 8NH to 12M, I know we can get our trans-continental relay through now without any trouble at all. So fellow relayers, let us all try hard now.

Mr. J. A. Benn, Marconi operator on the WRD (Str. D. G. Scofield) wrote and said he heard 6EA working with a 6PW (near San Jose) while he was at Point Wells, 20 miles north of Seattle, or approximately 1,080 miles from Los Angeles. Quoted from his letter he said, "Upon this evening (Jan. 14th) I returned to the ship from a visit with some friends at 11:45 P. M., and sat in for a few minutes to see what was doing." "This being Sunday night it was quiet, as usual, so I tuned for the so called 'HAMS.' It was just 11:50 P. M. when I heard 6EA signing quite readable. "If it was not for the

QRM from VAK (Victoria, B. C.) I could have read every word you were saying with no trouble whatever."

6EA was heard by the following long distance stations in January: 7DJ, Hoquiam, Wash., 975 miles from here; 7LF, 7AF, 7DQ, 7PD, Portland, Oreg., 850 miles from here; KIY, Colorado Springs, Colo., 850 miles from here.

PACIFIC COAST ANNOUNCEMENTS.

Rev. S. Ruth (7YS) of Lacey, Wash., was appointed as Assistant Manager to Seefred Bros., for Trunk Line "F" since we had to cancel the appointment of Mr. Chas. L. Austin (KDP) of Portland, Ore., as Assistant Manager.

After finding that 8:15 P. M., was a little too early to make any tests on the trunk lines, we have changed it from 8:15 P. M. to 10:15 P. M. "QRM" seems to be in bed at 10:15 P. M.

Mr. L. Winsor (6ZW) of Bakersfield, Cal., will not be in the radio game for some time, as he is employed at the Pacific Light and Power Corp., at Big Creek, Cal.

Mr. H. P. Gilbert (6AAG) of Pomona, Cal., will be out of the radio game for some time also, as he is employed at the Pacific Light and Power Corp. at East Bakersfield, Cal.

Mr. L. Bunting (6BJ) of Centerville, Cal., will be out of the radio game for some time, as his station and transmitting set were partly destroyed by fire.

Dr. R. O. Shelton (6SR) of San Diego, Cal., sent us word that his wireless career passed with 1916, and will be interested in other lines during 1917.

DISTRICT OF NEW YORK AND CONNECTICUT.

Mr. J. O. Smith (2ZL) Superintendent, Valley Stream, Long Island.

The volume of message traffic handled in this section during January was of such proportions as to warrant the belief that it will hereafter equal or exceed the high-water mark set in the latter part of 1916. During the months of November

and December just passed, the volume of traffic became greater than ever before known in the history of amateur radio and the idea was expressed by many that this was only a temporary abnormal condition, due to the annual fall and early winter period of enthusiasm on the part of amateur station owners.

The figures for the various stations in this district for January, however, indisputably prove that the trunk line service of the League has proved so dependable and accurate and has become so important in the amateur radio world that it has attracted to itself a large and permanent volume of traffic.

Good progress has been made in the organization of a branch line through the center of New York State; between New York City and Buffalo. Station owners at Scranton, Binghamton, Geneva, Ithaca, Rochester and Buffalo have come forward with offers to help in the work as much as possible and before long it should be possible to handle traffic over this branch under almost any conditions. Special mention is due Mr. Fraser, at Buffalo, 8VX, and Bush Brothers, 8WO, at Binghamton, for their kind assistance in getting things started in their respective localities.

At last an accurate connecting link has been formed between the Second District and New England. Traffic between the two sections is now being handled regularly between 1DK, at Bridgeport, and 2FS, at Babylon, L. I., and 2ZL.

Stations in districts West or South of New York are requested to route traffic for New England, via 2ZL and 2FS, which will insure prompt handling. Stations in the First District are requested to route traffic via 1DK in the other direction.

The writer wants to encourage the practice of handling traffic in short relays wherever possible. This makes for greater accuracy, less interference troubles and gives more stations a chance to get into the relay game. All operators are urged to give their messages to the next nearest dependable station with regard to the direction in which the traffic is bound.

During January 2ZL station was in operation only two weeks and consequently the total amount of traffic handled was

small, compared to other months. Very little long-distance work was done.

All records for this section were broken in January, for a single month, when 2VZ, at Yonkers, handled 283 messages. Outside of 172 local messages, exchanged with local stations, 2VZ worked 2AGJ, at Albany, (sent 32, received 59); 8NH, 9PC, 8JZ, 8YI, and 8ARH, totalling 111 messages. Mr. Runyon has plainly done more than his share in handling this large amount of traffic, and his efforts are most certainly appreciated, both by the League officers and the many local station operators for whom he has relayed messages.

Mr. Hubbard, at 2ZP, Port Chester, was not able to do his usual amount of work during January because of sickness and condenser troubles. This station handled 35 messages in the case of the following: 8AAK, 8VX, 8NH, 5BV, 2AGJ, 1IZ and 1DK, and also did considerable local work.

Remarkable long-distance work was done by 2PM station, although in operation for only part of the month. Messrs Faraon and Grinan report that they handled a message from San Francisco with only one relay, at 9GC. They are using 1 KW 60-cycle synchronous set on exactly 200 meters, and 9GC reports 2PM signals as strong there. Faraon and Grinan also report having worked 9ZF at Denver, the latter having been in communication with 6EA at the same time. In addition to this long-distance work, 2PM handled 30 messages with distant stations, via: 2AGJ, 8YI, 8AEZ, 9GY, 8JZ, 3PG and 1IZ. The station also did considerable local relay work.

Brooklyn business was taken care of during the month by 2BO, and 64 messages were handled, mostly from local stations. This local work may not be as spectacular as working over long distances, but nevertheless it is very important to the league to have a central collecting and distributing point in a large city like Brooklyn. Mr. McIntire deserves much credit for his earnest efforts to effect deliveries and reporting back and wrong addresses, etc.

The newly organized Long Island branch is as follows:

Brooklyn	2BO	M. A. McIntire.
Valley Stream	2ZL	J. Q. Smith
Freeport	2OE	S. L. Raynor
Babylon	2FS	H. L. Stanley
Brightwaters	2RL	V. F. Camp
Bay Shore	2ATT	Gurdon Knapp
Sayville	2NT	Mortimer Brown
Patchogue	2DD	F. M. Hammond
Southampton	2APZ	R. J. Freeman

REPORT OF TRUNK LINES "A", "E" AND "C"

This report shows the achievement of our most cherished ideal—that of relaying successfully to the Pacific Coast, not test messages which have been arranged, but real messagework which must go through every night in the week. Particular attention is called to the change in routing of Route E and also to the fact that Branch 21 and Trunk Line G have changed names. Since No. 21 (old) reached the coast ahead of any other line, as a reward for its effort it has been given the title of Trunk Line G, while old Route G becomes Branch No. 21. This new route (G) has handled a tremendous amount of business as is a very versatile route, since 8NH, 9ZN, 9GY, 9ABD, and 9MQ can all work 9ZF at Denver successfully, thus insuring the transmission of business even if one station is not working.

Messages sent over an A. R. R. L. route and routed via Route G or Route E can reach the coast without fail so we invite all A. R. R. L. members to use these routes to the best advantage. Mr. A. I. Graham and Mr. G. E. Wilson of Kansas City have been especially kind and have done a great deal in assisting in the formation of the coast routes and we wish to publicly thank them both for their help.

A new branch, No. 30, has been added to Route E, starting from 5ZC. This route joins Dallas with Mineral Wells, Texas, through Mr. David Goldman of that town.

Messages have been coming right along all over the routes, although not so heavily since the holidays. Mr. Hewitt at 2AGJ has handled 215 messages since January, several of which were unique for the distance covered in a few steps. One example was a set of six from Los Angeles,

Cal., which went via 6AAG, 9ZF, 9XM, 2AGJ. All six were sent without repetition at any point. Quite some work.

Especial praise is due to station 2PM at New York which has attended to a great deal of New York traffic via 2AGJ. When Mr. Smith of 2LK (now 2ZL) has been away, 2PM has handled all the New York message work.

ROUTE E

9ZN—Chicago, Ill.
9GY—Mattoon, Ill.
9ABD—Jefferson City, Mo.
5BV—Little Rock, Ark.
5ZC and 5DU—Dallas, Texas.
6DM—Phoenix, Ariz.
6AAG—Pomona, Cal.
9ZN—Chicago, Ill.
9GY—Mattoon, Ill.
9ABD—Jefferson City, Mo.
9ZF and 9AMT—Denver, Colo.
6EA—Los Angeles, Cal.

HEARD AT 9RW, SHEBOYGAN, WIS. IN ADDITION TO THOSE PREVIOUSLY REPORTED

1ZL, 5AP, 8VX, 8IO, 8PR, 9AIG, 9AIK, 9AIM, 9ALF, 9DK, 9FN, 9LP, 9LW, 9QF, 9QK, 9QR, 9QJ, 9KV, 9NW, 9UK, 9WT, 9ZE, 9ZO.

This station has been heard at the following stations.

9AM, 9ZN, 9AOL, 9TA, 9GY, 9YI, 8JA, 8ASG, 8CS, 8JZ, 8NH, 8JY, 8AOR, 8JX, 9AGA, 9AOL, 9AEF, 9NU, 9AOT, 9HX, 2PH, 2ALL.

Heard at 9ZL, Louisville, Ill., in addition to those previously reported.

5EC, 4AM, 4AC, 5EX, 5YG, 8AEH, 9QF, 9ZL, 9ABM.

Heard at 9VK, Kenosha, Wis.

2WB, 3PM, 5AP, 5AX, 5BV, 5ZC, 8AAQ, 8AEZ, 8AIF, 8KA, 8NH, 8OT, 9AAB, 9AAR, 9ABD, 9ACT, 9ADT, 9AIB, 9AIM, 9AKW, 9AKY, 9AOH, 9AU, 8BA, 9BF, 9CB, 9EE, 9EEN, 9EK, 9FB, 9GY, 9HQ, 9IF, 9JI, 9JS, 9JW, 9KU, 9LB, 9LV, 9MA, 9ME, 9MG, 9NC, 9OS, 9OT, 9PW, 9QF, 9RK, 9RW, 9SJ, 9SP, 9SQ, 9TK, 9UR, 9UK, 9UT, 9VY, 9WG, 9WT, 9WW, 9XA, 9XB, 9XM, 9ZB, 9ZN, 9ZG.

Heard at 9GY, Mattoon, Ill., in addition to those previously reported.

1VN, 1IZ, 1ZL, 1ZM, 2AGJ, 2LK, 2PM, 2TA, 2JU, 2ZC, 2YM, 2ZK, 2ATR, 3UF, 3NC, 3SQ, 3XC, 3ZM, 4CL, 4AA, 4AM, 4AC, 4FB, 5BV, 5DU, 5BB, 5ED, 5AX, 5ZC, 5YG, 5ZM, CV (Houston, Tex.)

Have handled 205 messages to date.

Heard at 5BY, Little Rock, Ark.

2AGJ, 4AA, 4AM, 4CL, 4DI, 5AB, 5AM, 5AP, 5AX, 5BB, 5BP, 5BT, 5DA, 5DU, 5EB, 5ES, 5EF, 8AAK, 8AAR, 8ABE, 8ACK, 8AEH, 8AEM, 8AES, 8AIR, 8AOP, 8AOL, 8ASG, 8CO, 8CS, 8JA, 8JY.

8JZ, 8KA, 8KS, 8LT, 8NF, 8NH, 8NP, 8OU, 8PA, 8SK, 8PX, 8AAB, 8AAR, 8AAU, 8ABD, 8AAZ, 8ABM, 8ABU, 8ACE, 8ACM, 8ACS, 8ADW, 8AET, 8AFE, 8AGB, 8AIH, 8AIM, 8AU, 8BA, 8BJ, 8DB, 8DG, 8DM, 8DV, 8DY, 8EG, 8FF, 8FW, 8GJ, 8GP, 8GR, 8GY, 8HQ, 8HS, 8HU, 8HX, 8JI, 8JO, 8JW, 8KS, 8LM, 8LO, 8LW, 8ME, 8MK, 8ML, 8MQ, 8NN, 8NW, 8OT, 8PC, 8PF, 8PI, 8RD, 8RW, 8SP, 8TA, 8UY, 8VG, 8VP, 8VY, 8WF, 8WG, 8WU, 8YG, 8ZC, 8ZM, 8ZQ, 8XA, 8YL, 8YO, 8ZW, 89XL, 8XV, 8YA, 8YE, 8YI, 8YO, 8YS, 8ZF, 8ZL, 8ZN, 8CV, 8SN, 8MS, 8CR, 8WCH, 8REX, 8GR, 8GH, 8BCH.

Wish to report that during the month of January the following stations were heard at 8JZ, and all are over 100 miles from Cleveland, Ohio.

1IZ, 1ZR, 1ZL, 2AGJ, 2ZK, 2VQ, 2YM, 2AUG, 2UF, 2PM, 2IM, 3NB, 3SZ, 3UF, 5DU, 5AX, 5BV, 8AEZ, 8AKM, 8AIR, 8ARH, 8ASG, 8EC, 8NH, 8JG, 8JQ, 8OT, 8YO, 8ZP, 8AAR, 8ADM, 8AU, 8ABU, 8AMI, 8ALM, 8AMY, 8BA, 8EG, 8EP, 8DK, 8HX, 8JI, 8HS, 8JW, 8GJ, 8GY, 8PI, 8PC, 8PF, 8LO, 8LR, 8VP, 8NN, 8UH, 8WW, 8WC, 8XN, 8ZL, 8ZN, 8ZL.

Heard at 2AGJ, Albany, N. Y.

1IZ, 1ZO, 1ZF, 1ZM, 1ZI, 1YK, 1ZS, 1DK, 1ZW, 2LK, 2VZ, 2PM, 3JU, 2ZV, 2ZP, 2CB, 2IM, 2AFN, 3SZ, 3ZS, 3FR, 3TQ, 3AEP, 3NB, 3UF, 3AI, 3RS, 4AA, 4CL, 3NH, 8AEZ, 8AKM, 8JZ, 8AIR, 8AAK, 8JG, 8RK, 8OT, 8JK, 8VC, 8ZP, 8ZJ, 8UX, 8TM, 8HJ, 8ABE, 8AAE, 8AMG, 8AKP, 8AAQ, 8ASC, 8LE, 8YI, 8YO, 8XA, 8ARH, 8AIF, 8NN, 8NQ, 8FI, 8AGR, 8AOI, 8CO, 8CL, 8LO, 8VO, 8PA, 8NF, 8ZX, 8QK, 8YL, 8PF, 8VP, 8RK, 8EG, 8ANO, 8QR, 8AUS, 8BJ, 8AIM, 8AMY, 8WW, 8ZF, 8SX, 8TA, 8XM, 8HS, 8GY, 8ZN, 8ALM, 8HQ, 8ABD, 8UH, 8HX, 8AAR, 8DK, 8NW, 8ALD, 8RW, 8NU, 8AU, 8WQ, 8VY, 8ON, 8AAB, 8JI, 8PI, 8PC, 8WF, 8QU.

Heard at 8ZN, Chicago, Ill.

1ZL, 1ZD, 1ZM, 2AGJ, 2ZK, 2ZP, 2NC, 2PM, 2ABG, 2ZL, 2LK, 2JU, 2YM, 3PY, 3UF, 4AA, 4CL, 5ZC, 5DU, 5BV, 5AX, 5ZM, 5EX, 5ED, 8AEZ, 8MW, 8ZW, 8ARH, 8VX, 8PC, 8ZP, 8AIH, 8AIR, 8AAK, 8ARE, 8XA, 8YI, 8YL, 8VP, 8ASC, 8JZ, 8SP, 8HQ, 8MQ, 8ZO, 8GY, 8ABD, 8EP, 8DC, 8ZR, 8EG, 8AMY, 8AIM, 8LQ, 8PW, 8VK, 8NU, 8ADL, 8UR, 8UK, 8RW, 8DM, 8WH, 8DB, 8XM, 8MK, 8ZG, 8ZF, 8AHO, 8ALR, 8VM, 8ZL, 8GU, 8UT, 8BJ, 8PI, 8NW, 8AMT, 8TA, 8QL, 8GJ, 8ZL, 8FW, 8HX, 8RF, 8XN, 8BI, 8WS.

285 messages handled during January.

MONTHLY REPORT OF TRUNK LINES "C" and "D".

A. A. Hebert, Manager.

Relay work is being conducted with a vim on both routes, and the relay stations have been working over-time, as the members are taking advantage of the privilege they enjoy in being able to communicate with their friends through the efficient work of the Trunk Line Stations.

On January 30th, a test had been arranged for between your Manager and Mr. Cooper, Superintendent of the Districts of Florida and Georgia, to determine which route would be more efficient. Promptly at the hour set (10:30 p. m.) the message was given to 2ZL who was to give it to 3ZW, but QRN was so bad in this section that we could not raise 3ZW nor 3RO who was to take the message from 3ZW. At 11 o'clock the other message was started on the second route which was to be via 8ARZ, but again QRN was so bad that we could not get 8AEZ, although at about 11:20, I heard 8AEZ giving a message addressed to me asking to proceed, but signals were too weak to try to do real work. While we are more or less disappointed at our failure, we have to blame nature for it. Another test will be arranged for before the end of the month.

On Feb. 4th a test message was started on route "D" addressed to 8LJ at Dayton, and was handled very efficiently by 2PM, 8YI, 8VL and 8ASG.

The purpose of these messages is to test for shorter distances rather than trying to handle them with the least number of stations, and in this way we obtain a good idea of the stations which are on the job regularly. It is my intention to start three or four of these messages every week.

Mr. Chas A Service, Jr., of Bala, Penn. has been appointed District Superintendent for the States of Pennsylvania, Maryland and Delaware, and is to have supervision of all Trunk Line matters in the states in question. All members of the League in these states should communicate with Mr. Service on all matters pertaining to relay work or anything which is of interest to the League. Mr. Service will report direct to me. We feel that we should be congratulated in our new official, as he has shown himself a worker in the past and will undoubtedly continue in the good work.

I take this means of thanking both Mr. Service and Mr. J. F. Rau (3AEP) for the trip they took to Baltimore in the interest of the League and members in that city. From the report given me we will have to take our hats off to the Baltimore boys for the enthusiasm shown in the

relay work and for their being able to control QRM through their efficient Radio Club.

Most sections are awakening to the nightmare of QRM, and the number of Radio Clubs being formed in the different cities augurs well for the elimination of a great deal of interference which is mostly due to ignorance rather than to willfulness or thoughtlessness.

CHANGES. LINE "D"

Add Chattanooga, Tenn. Chattanooga Radio Club. This station is between Cleveland, Tenn. and Huntsville, Ala.

Springfield, Ohio. Cancel 8FH and 8ZM. Add 8AOF.

Hamilton, Ohio. Add, 8GL, Henry Konard.

Mr. Wm. Macks informs us that his address is 2414 Painter St., New Orleans, La., instead of Franklinton, La., as shown in the government call book. Mr Macks is also the terminus of Trunk Line "D" in New Orleans.

In the last report mention was made of the efficient work being done by Mr. Duvall of Baltimore, we should have also mentioned Mr. Alan P. Smith 3rd., who is joint owner of the station and also deserves credit.

Stations heard:

3GC, Bethlehem, Pa., reports hearing the following: 2WB, 2YM, 2ZH, 2AGJ, 3AF, 3AFA, 3UF, 3XC, 3ZS, 4AA, 4AU, 8YI, 5ZM, 8NH, 8XA, 8LJ, 8CS, 8CO, 8ZW, 8WO, 9VY, 9AU, 9EM, 9PC, 9PY, 3PC, 8LN, 3SQ, 3QD, 8AR, 8ALE, 8AEZ, and many more whose calls were not taken down.

At 2AAZ; 1IZ, 1VN, 2AGJ, 3NB, 3SQ, 8AEZ, 8YI, 8PA, 8ABE, 8NH, 8KS, 9AAR, 9VY, and 9ZN.

DISTRICT OF VIRGINIA AND NORTH CAROLINA.

Mr. W. T. Gravely, Supt. (3RO) reports that not very much relay work was done during January. The Trunk Line stations are improving their sets and every one still keeps up the interest.

4DI, reports working the following stations: 4AA, 4AC, 4BE, 4CE, 4DG, 9PC,

and 8VX.

Heard at 3RO: 2NZ, 2AGJ, 2LK (now 2ZL), 2JD, 2SZ, 3AR, 3AK, 3IZ, 3WE, 3OZ, 3AX, 3RS, 4DG, 4AK, 4CL, 4AC, 4AA, 4DM, 4BE, 5AP, 5BV, 5ZM, 5AM, 5BB, 5MI, 5EX, 8PA, 8AEH, 8AEZ, 8NH, 8ALE, 8XA, 8ASG, 8NQ, 8IK, 8AAK, 8ZK, 8ASC, 9DU, 9ABD, 9ZL, 9PC, 9PI, 9AIM, 9GY, 9UK, 9BA, 9KG, 9EW, 9ABU, 9HX, 9ZL, 9TM, 9XM, 9MG, 9JI.

3SZ, reports conditions very bad in his section and while he heard a number of stations, worked only one, 8JZ. Heard: 8PA, 8NH, 5AV, 8AEZ, 3UF, 2AGJ, 8YO, 4AC, 8KS, 1EH, 8LQ, 2JU, 9VY, 9ABD.

The best work so far recorded was made by 2PM, New York City who worked with Denver.

We shall appreciate receiving suggestions with the view of making the League better than it is, so don't be bashful if you have anything to offer.

DISTRICT OF FLORIDA AND GEORGIA.

The disappointment of Mr. Cooper, in not receiving our test message on the 30th of January, was so great, that he thought he would punish us by not sending in his report. We will blame the test message for it any way.

Arthur A. Hebert,

246 Highfield Lane,

Nutley, N. J.

ANNOUNCEMENT.

The Manhattan Electrical Supply Co., Inc. of St. Louis, wish to announce that from now on they will have a complete stock of all the latest and most approved wireless apparatus, and will make a specialty of shipping all orders the day received.

This Department is managed by Mr. W. E. Woods, owner of Station 9HS.

A complete and absolutely modern station is being installed. The receiving end consists of a Mesco short wave receiver of new design, which will be announced at an early date, and a large and very efficient undamped wave set.

For a transmitting set a 1 K. W. hytone transmitter will be used.

Orders will be taken by radio for any apparatus. The call 9HS will be used until a license is procured.

Radio Communications by the Amateurs

SUBJ. RADIOGRAM BY MAIL VIA
AEROPLANE AND SUBMARINE
TO HARTFORD, CONNECTICUT.

(hope it arrives safely)—

QST Publishing Co.,
Hartford, Conn.

Buffalo, N. Y.,
January 15, 1917.

Gentlemen:—

Just a few stations that were heard lately, using a galena detector with a single wire aerial 75 ft. long.

8ZW (loud and clear) 8XA (loud at times, good tone).

8JA (rather faint but readable) 8AEZ (faint).

Have read with interest the various lists of long distance work and thought perhaps this would interest someone else.

The January QST is certainly a peach, and the QRM stories are the best I have ever read of that kind. What will the O M have next time? Perhaps QSB.

Well O M (Please excuse me females if you happen to read this, in that case I would mean O W, 8NH note) my spk. is bad. Have only single wire antenna because my regular 4 wire is lying on the ground beneath the snow and all tangled up. The aerial rope gave out in a recent storm and Z a m — — — went the spreader and cracked in the middle when it landed (only 40 ft.). And there it is now, waiting for reasonable weather so that I can repair it.

Therefore, Nil, Gn,

Arthur C. Young, 8ARB

1311 Abbott Road, Buffalo, N. Y.

ACY—by myself.

P. S.—Good luck to QST and its owners.

— —

GRATEFUL FOR QST'S HELP.

Mr. Homer E. Nichols of Bridgeport, Conn., writes: "Being somewhat of a Methodist, an old song comes to my mind entitled "Once I Was Blind, But Now I Can See," which I have revised a la wireless to be. "Once my audion was deaf, but now it can hear. Also He who hath an audion to hear, let it hear."

Perhaps you wonder why the philosophy, but it is from actual results that I rave as I do. The official organ of the A. R. R. L., known as QST, put out an article in their December issue, which I was struck with the moment I read it. Needless to say, I even went further, for I carried out what the article contained to the letter, and the results followed. The article to which I refer, was concerning the regenerative audion outfit. Now, Mr. President, perhaps I am too elated over its results, but when an amateur who is only accustomed to hearing local and commercial stations within a radio of 150 miles (except NAA), and then suddenly by a change of a few instruments, can strike a veritable score of local and long distance amateurs, why should he not be delighted.

You may judge for yourself as to my results, and if you think it worthy of mention, kindly give them to our crackerjack Editor, or else throw them out.

I completed the set and hooked it up to my audion about a week and a half ago and the following is the list of stations received. 1ABF, 1ABO, 1ARE, 1AJP, 1ASQ, 1DD, 1DZ, 1ESL, 1CM, 1PT, 1ZM, 1ZS, 2ABD, 2ABG, 2AGJ, 2AIO, 2ATT, 2AUG, 2CE, 2BU, 2LK, 2ML, 2PK, 2BL, 2YM, 2ZK, 2ZP, 2ZS, 8UX, HM. Commercial: NAE, NAC, WST, and all regular N. Y. stations and sound steamers.

Your station at Hartford comes in here nearly as well as WLC, as does also 2LK and 1CM, both of which are QSA. At

first I thought I had a good short distance set until one evening at 11:00 p. m., I got 8UX working 1ZF. Sigs. were fine.

I have never had as much fun with wireless, altogether, as I have had in the last week, and I certainly want to commend the work that is being pushed forward, especially the endeavors of our editor, Brother Tuska, and trust that he may receive the success in this coming year, which is his due. I am in hopes of owning a good transmitting set assembled a la QST way, and get into the relay game. Hoping you will hand my record to our Secretary, if you think it worthy, and personally expressing to him my sincere thanks for what QST has done for me, I am,"

MORE GOOD WORK.

Mr. Fred Texman, of Stanford University, Cal., writes:—"To keep the ball rolling, I am sending in a list of some of the calls heard at 6FT, about 25 miles south of San Francisco. The receiving set has used galena and iron pyrites, usually the latter, and the results show what can be done without an audion. The aerial is only 45 feet high and 70 feet long. The calls are:

Call	Place	Miles
6AAG	Ponoma, Cal.	360
6ABR	Los Angeles, Cal.	320
6AV	Reno, Nev.	200
6BV	Redlands, Cal.	360
6CX	Los Angeles, Cal.	320
6DM	Phoenix, , Arizona.	660
6EA	Los Angeles, Cal.	320
6GJ	Los Angeles, Cal.	320
6NL	Reno, Nev.	200
6NN	Los Angeles, Cal.	320
6OE	Los Angeles, Cal.	320
6OK	Los Angeles, Cal.	320
6QU	Los Angeles, Cal.	320
6RG	San Diego, Cal.	430
6SR	San Diego, Cal.	430
6TL	Los Angeles, Cal.	320
6UP	Los Angeles, Cal.	320
6WI	Pasadena, Cal.	320
6ZW	Bakersfield, Cal.	225
DPA	Whittier, Cal.	320

I have a ½ kw. set and have been heard

by most of the above stations, east as far as 6AV, north to 7AF, Portland, 600 miles. and south to 6DM. If any one hears 6FT, I would be very glad if they would drop a card addressed to me at Stanford University, Calif., and I will be glad to give them a detailed description of my set, and arrange tests.

I am a strong booster for QST, and enclosed is one dollar for renewal of my subscription."

A QST FAN.

Mr. Orlo Palmer of Holland, Mich. writes: "Following is a list of amateur stations I have heard this Fall. I am using condenser in series with an aerial 78 ft. high and 128 ft. long, and galena detector.

8AEZ, 8DR, 8KS, 8NH, 8AHK, 8PA, 8ZC, 8YO, 8CL, 9EG, 9GY, 9TA, 9SD, 9NN, 9BJ, 9JI, 9AKP, 9DB, 9GJ, 9VY, 9HX, 9AIK, 9WF, 9WW, 9ACM, 9FW, 9YO, 9XS.

I am using a short aerial for sending, and if any of the QST readers should hear my call, 8ASZ, I would be very much pleased to hear from them.

I read all the wireless magazines, but QST has them all beat a mile. Nothing to it!"

HEARD AT 9OY'S STATION.

Mr. Jack Fritz, St. Louis, Mo., 9OY, writes: "After reading some of the articles describing distant receiving accomplished by some amateurs, I would like to submit the following list of amateurs heard at my station "9OY," during the past three months. All of these stations were copied on galena. I will be pleased to let any of them know how they came in if they will drop me a postal.

5BV, 8YO, 9ABD, 8PA, 9PC, 8AEZ, 9EM, 9LQ, 9WC, 9GY, 9AMI, 9EP, 8ASG, 9HX.

5BV, 9ABD, 9GY and 9HX fade very much. 9WC came in clear and loud on the night of Nov. 24th at 11:35 p. m."

BUTLER NEEDS HELP ON QRM.

Mr. Arthur R. Shedd, 8AEP, Butler, Pa., writes: "I think it is a fine idea to publish a list of some of the distant fellows, and this idea is original with QST. Butler has never been rated for wireless, owing to the fierce QRM from motors, street cars, etc. If any of you fellow amateurs know how to remedy this, I wish you would drop me a line.

Here are a few calls which have to come in QSA, or I could not get them. I have been heard by a few distant fellows, and wish any fellow over one hundred miles away hearing me, would drop me a card.

1ZM, 1ZL, 1IZ, 2ABG, 2JU, 2JD, 2PM, 2ZP, 2LQ, 2ZK, 2LK, 2ZV, 2AGJ, 2DA, 3UF, 3XC, 3AEP, 3AFL, 8VX, 8CX, 8CS, 8ZP, 8XA, 8YL, 8ZW, 8AAK, 8AEZ, 8NH, 8ASG, 8AIR, 8QB, 8JZ, 8AOF, 8NQ, 8LB, 8ADR, 8AML, 9UC, 9VY, 9GJ, 9GY, 9ACR, 9EG, 9GM, 9ARK, 9ACO. Have also heard about fifty more calls.

I use a regenerative receiver, and have a $\frac{1}{2}$ k.w. Packard transformer, and radiation of 2.6 amps. Pretty good, eh!

I wish to congratulate you on QST. It is and always will be the best amateur magazine, and is always found in the best stations."

ON THE TRANS-CONTINENTAL RELAY.

Mr. Robert C. Higgy, 6DM, of Phoenix, Ariz., writes: "After reading over Mr. Maxim's article in QST on a Trans-continental Relay, I have been working hard on my transmitting set, and have succeeded in working with 9ZF at Denver, as well as many California amateurs. Monday night, Jan. 15th, I handled four messages from 9ZF for California cities, two of them had come from Chicago.

I have been thinking of a plan for the Trans-continental Relay, and I believe that in two weeks, we can get a line of stations working. This is my proposed route: 1ZM, 8AEZ, 9ZN, 9XN, 9ZF, 6DM and 6AAG. All of these stations have worked each other, and will have very little trouble getting a msg. through at any time.

Now as all of these stations have more or less work on Trunk Lines, or other work for the A. R. R. L., I will be glad to manage this line and get them together so we can have a test soon.

I am enclosing a list of stations I hear and wish you would publish them in QST, as many of them will be glad to see their calls.

Heard prior to Jan. 15th: 5ZC, 5DU, 5YG, 9JW, 9NN, 9ZF, 9EP, 5ED, FC, 9AED, 5AX, CD, 9VY, 9AMT, 9IO, 9YO, 9YI, 9ADK, YJ, 9AHO, 9FU, 9ACN, 9FT, 5BP, 5BT, SN, 9LQ, 9QJ, 9ADU, 9DM, 5AB, 9RG, 9AMI, 9AMJ, 9GW, 9GR, 5BJ. Western: 6KL, 6II, 6AEJ, 6VF, 6WI, "JS", 6ABR, 6AHN, 6IB, 6BY, 6BJ, 6SR, 6TO, 6TL, 6NN, 6DNK, 6TQ, 6OK, 6SI, 6HH, 6UP, 6SJ, 6JG, 6HQ, 6MP, 6CL, 6WZ, 6CX, 6DT, 6ZW, 6SS, 6PW, 6MR, 6WJ, 6WG, 6AGW, 6FT, 6LW, 6RG, 6SH, 6OE, 6EA, 6LF, 6QK, 6NX, 6SO, 6OI, 6TR, 6SR, 6SX, 6LZ, 6BD, 6RW, 6SU, 6AL, 6ZV, KP, 6AV, 6XL, 6HO, 6PK, 6AT, 6KU, 6NL, 6AC, 6QF, 6ABK, 6MM, 6TY, 6DI, DPA, 6GW, 6HX, 6GI and 7EY."

ANOTHER ONE FOR "EDDY."

W. E. Woods of St. Louis, Mo., 9HS writes: "Dear Eddy: Once more I wish to compliment you on the way QST is coming to the front. The last issue was better than the preceding one, and each issue is so full of new and original ideas, that we are all wondering how long it will be until you run out of ideas.

The fellows here in St. Louis are so enthusiastic about the magazine, that all we hear in the ether, the day it arrives, is "QST." I noticed in a late issue that the idea prevails in the east, that the receiving sets of the middle west amateurs are not very efficient. Well Eddy, O. M., they sure have the wrong idea. I am willing to wager that for all around efficiency, the sets here in St. Louis will put many of 'em to shame.

The day I received my December QST, I constructed the short wave regenerative set described therein, and believe me, if every station was equipped with a set like

it, we could certainly do some distant work. It is so selective, as to be a bother. After calling CQ, it is necessary to keep all the switches on the jump, in order to hear 'em all. It is very seldom indeed, that two stations can be heard together, but if so, the one desired can always be read.

Several of the "bugs" paid me a visit the other evening. After we were all "hooked in," I turned on the audion. One of the fellows immediately threw off his phones with the remark "Don't these hams ever stop hanging on their keys?" Ha! He thought he was hearing local stuff. It's a fact tho', that 5BV, 5DU, 5ZC, 5AX, 8CS, 8NH, 8AAK, 9GY, 9HQ, and ever so many I cannot recall at present, can be READ with the phones on the table. While 2AGJ, 2LK, 12M, 8VX, 4AA and 4CL sound like they were over in Illinois, right across the river. I consider you did me a personal favor, Eddy, when you published that hook-up.

But coming back to the original idea—St. Louis stations—the results I have gotten are by no means unusual as there are seven stations here that do as good or better. Any of us could take a msg. from Albany, N. Y., and shoot it to Houston, Texas at one "pop." That's sending a msg. over 1500 miles with only one relay. Nothing much wrong with that, 'eh? And your, or better still "our" little magazine has made it possible. Guess we haven't got it on the Western Union, and "we" are considered by the public to be only a bunch of "troublesome boys that like to monkey with a lot of old wires and batteries." Ha! If they all knew we would gladly send a message across the country for 'em, free, I bet they would change their minds.

Come on fellows, send some of your messages through St. Louis. It's true we have had a lot of local QRM, but the new St. Louis Radio Association will see to that, and as the Radio Inspector arrives tomorrow, we can assure you all that we are out for business, and ready to sit up till 2:00 a. m. any old time.

A word about this early morning stuff. It seems to be a very good idea. Let's all give it a shot the first few days after we get "our QST." Hi! Won't hurt to try it, and it will probably prove "the thing." Well, fellows, if you ever hear

9HS, give me a wail and I will do my best for you.

Wishing the best success ever to QST, I am 9HS."

SOME MORE ON QRM.

Mr. Richard C. Innes of New York writes: "QRM as discussed in January QST, although true to general facts, should not have been condensed so strongly. The rights and privileges of every amateur who conforms to our laws;—wave length, decrement and individual license, permits him to send and operate his set whenever and as long as he wishes to do so. Our only means of relieving QRM, is to analyze the causes, and remedy them by appealing to the separate classes of amateurs individually. My suggestions and classifications, that I have experienced in the past seven years, are as follows:

1. Spark coil operators.
2. Transformer operators who are technically inefficient and never get more than fifty miles out of their sets.
3. Transformer operators who by their superior technical knowledge or by the help of others, have succeeded in communicating long distances.
4. Transformer operators who have succeeded in obtaining Special Licenses, due to their wonderful efficient work and broad knowledge of the wireless game.

My first suggestion is to raise the speed code test from five to twelve words per minute, and to raise the standard of the questions contained in the examination. This eliminates the beginner with the money to put in a transformer of $\frac{1}{2}$ or 1 k.w. and who persists in asking one to repeat plus a lot of foolish questions and unnecessary conversation.

The spark coil operator is usually a beginner or, in a few cases, a reliable operator who has not the financial means to improve his set. The former in nearly all cases does not conform to the law in any respect, and the proper thing to do is to report him. A little discretion and a personal invitation to visit, will usually find

out his name, etc. The latter class of amateurs who conform to our laws, and are handicapped financially, should not be discouraged. His time comes later, and usually develops a high class wireless man.

Classes Nos. 2 and 3 shows forth the over ambitious operators who, having worked a distant station on an extra fine night, persist in calling constantly, hoping that another long distant fellow will by chance pick him up. A little courtesy goes far. They should listen before they send or test. Then send out a "4," if all is clear, then go ahead with the regulation call and then quit. If answered, go ahead, short and businesslike, then stand by and let another fellow try it. Don't hog it.

The rest of the fellows are human and will soon get wise to themselves. Of course, the fellow who wants his own way and everything else, will always exist. A little cold treatment will fix him. If it doesn't, watch his wave length, and if he is over 200 meters, don't be a coward, but turn his name in to the Inspector.

Then again, if a fellow has a set that really can do distance consistently, let him come forth and try for a Special License to allow him to use a longer wave length.

I have also come across fellows who have very good sending sets, but ill-designed receiving outfits. No matter how they tune, it was no better than a "stand by." Of course they growl at QRM. Let them get wise to themselves and read a little. QST has any amount of valuable technical literature pertaining to the design of sets that really work, and are not makeshifts.

In conclusion I wish to state, above all other things, the amateurs one and all, should be courteous to one another and cut down power when "talking" short distances. Remember that the law gives us the necessary freedom to utilize this wonderful wireless game, and if we abuse our privileges, and cause general dissatisfaction among themselves, they can shut us up once and for all. We all have the same privileges from the $\frac{1}{2}$ coil up to the 1 k.w. transformer.

I trust that you will pardon the liberty I have taken in addressing you as I am only a "silent listener," but one who gets them all. Yours for the general benefit of the game."

TENNESSEE MAKES A SHOWING.

Mr. S. H. Sheib, 5CY, of Nashville, Tenn. writes: "I send you herewith a list of stations heard here between Jan. 1st and 16th. All of these are more than 200 miles distant:

4AC, 4AM, 4BE, 4CL, 5AM, 5AV, 5AX, 5BB, 5BV, 5DU, 5ZC, 8AEH, 8AEZ, 8CX, 8NF, 8NH, 8OY, 8PA, 8XA, 8YA, 9AAR, 9ABD, 9ABU, 9AIM, 9AM, 9AMI, 9AK, 9AIK, 9ACM, 9BA, 9BJ, 9CR, 9CT, 9DV, 9DK, 9DM, 9EG, 9EP, 9EX, 9GC, 9GJ, 9GK, 9GU, 9GY, 9HX, 9JI, 9JM, 9JW, 9KG, 9LQ, 9ME, 9NW, 9NX, 9OT, 9PC, 9PI, 9PO, 9RG, 9RK, 9TA, 9UC, 9UK, 9VH, 9VC, 9VP, 9WC, 9WG, 9WJ, 9ZL, also RH and WCH (Windrock, Tenn.)

Most of these have been heard many times."

MORE PRAISE FOR QST.

Mr. W. B. Pope, 4AA, of Athens, Ga., writes: "I want to say that QST is improving and expanding by leaps and bounds. Candidly, I am astounded at the astonishing improvement apparent in every succeeding issue.

Every amateur in the country should be a subscriber to this magazine, and every one who is not a subscriber, is losing many times the equivalent of the subscription price. In fact, I find some single issues are well worth the year's subscription, and I take a large number of technical publications, etc.

I am looking forward to the time when our southern amateurs will so improve their stations and install new stations, that we can do some effective Relay work.

Wishing you every success, and with heartiest best wishes, I beg to remain."

GETTING CLOSE TO IT.

One of our old reliables Willis Corwin at Jefferson City, Mo., better known as 9ABD, has written in something which shows how we are gradually getting closer and closer to handling traffic all the way across the Continent. Using his own

words, "Saturday night, I gave six messages to 9ZF at Denver, and took three from him. Then again last night, I took eight from him. Then I called 2AGJ at Albany, and gave him three of them. And just as I was signing off after my third message, I broke a condenser plate. While I was working 2AGJ, I heard 9ZF working 6EA at Los Angeles, so that had 2AGJ given me a message for the Pacific coast, it would have been a Trans-continental. Things looking good to me. 73 9ABD."

FROM ATLANTIC CITY.

Mr. John J. Jeffries, of Atlantic City, N. J. writes:—"I would be pleased to have you publish in QST that I have heard the following stations: 4DG, 9PC, 8JZ, 1CM, 8OH, and 8ZY. If any one has heard my call 3TZ, he would bestow on me a favor by dropping me a postal telling if I come in loud or faint."

FROM KANKAKEE.

Mr. Earl J. Radeke, of Kankakee, Ills., writes:—"I received my first QST today, and think it is the best wireless magazine published.

The following stations have been heard at 9ANJ on the nights of Dec. 29th, 30th and 31st:— 9ON, 9IW, 8NS, 9IK, 9IC, 9AAB, 9RA, 9AK, 9BN, 9XR, 8AEZ, 9GD, 9ZS, 9UK, 9AIM, 9ASM, 9YH, 9DY, 9SX, 9QM, 9ANR, 9RG, 9OG, 9DC, 9ZO, 9VY.

Any one hearing my call, would do me a great favor by publishing it in QST. I will be pleased to let the amateurs whose calls I have heard, know how they came in if they will notify me."

HEARD IN WASHINGTON, D. C.

Edwin Burg, 3CV of Washington, D. C. writes:—"I noticed in the last issue of QST, a number of lists of long distance amateur receiving records. Knowing that most amateurs are anxious to know how

far they have been heard, I am sending a list of those outside of this district who have been heard by me during the past month.

8AEZ, 8ACR, 8AAK, 8RZ, 8GY, 8AWA, 8IC, 8NH, 8NQ, 8SK, 8CL, 8KO, 8NF, 9IK, 8CO, 8XA, 9IC, 9XE, 9PC, 9VY, 9EV, 9ACM, 9LY, 9YA, 2LK, 2DA, 2JD, 2IG, 2AGJ, 2RL.

Most of these stations have been heard on galena, with which the best results have been obtained, but some of them have been heard with an audion.

A true booster of the A. R. R. L., and QST, the ONLY radio magazine "

GOOD SENDING.

Mr. George C. Cannon of New Rochelle, N. Y. writes: "Here is a little item for QST if you think it worth while. On the night of Jan. 7th, 1917, I heard Mr. J. O. Smith, 2LK, send either seventeen or eighteen messages south. These messages all went through, as far as I heard, without the receiving station breaking 2LK once. Mr. Smith held a speed of about seventeen or eighteen words a minute, clear steady work, at the end of each message he listened for "RK" and then went to the next. It was a perfect demonstration of consistent, fine sending, NOT fast, and altogether was the best piece of work I have heard, Navy, Commercial or Amateur, in a long time."

ENTHUSIASM.

Chester Bertolette of Crawford, N. J. writes:—"Allow me to say that in all the four years I have been reading electrical magazines, yours is without exception, the most interesting one I have ever read. When I read your magazine, I seem to know all the people who have their names in it. There is something that seems to make them all united, as though they all belonged to the same family.

I had to write you this letter to let you know the impression it gives a new reader.

PLAETUS CONDENSERII.

Ashley Williams of Lincoln, Nebr. writes:— "I think that call list stunt a pretty good idea, and as long as the ball has started rolling, we might as well keep it going. As a snow ball rolling, becomes larger, it needs more men to push it along, and in such a manner this idea must be kept alive. Here is a list of calls that I heard at my station during the night of Nov. 10th. This is a large list for one night, but I have an audion so that accounts for it.

9HQ, 9RP, 9YL, 9AIK, 9ZD, 9AIW, 9TZ, 9ABD, 9SW, 9IO, 9MQ, KIX, KKE, KTI, YJ, (U. of Neb), 8AEZ, 9HU, 9VS, 9VR, 9AHO, 9YG, 5AM, 9WR, CK, HI, CH, 9ZL, 9AHG, 9AHW, WHK, WPD, WUJ, NAR, KEO, WRD, KES, 9YA, MSP, SN.

If any of these amateurs who are quite a distance from Lincoln hear me, drop me a line as I want to find my range. My call is 9AHR.

The "Old Man" has happened around in this neighborhood, mostly in the form of a cracked condenser plate. I haven't heard of the lucky chap yet, who has thus far succeeded in sending from two to one thousand miles without cracking something, either his own nut or an animal which gives by the name of "plaetus condenserii."

P. S.—If there be such a man who has not had the misfortune mentioned above, please notify me promptly as he deserves a reward for his "luck."

BETTER LATE THAN NEVER.

Malcolm Woodman of Pepperell, Mass. writes:— "I am writing to tell you what I think of QST. Early last winter, I started to purchase monthly magazines containing wireless news. I thought I was getting all the wireless news out. What a mistake I was making! This is what changed my opinion.

One day I was visiting a distant amateur friend, when my attention was called to a nice looking magazine with QST printed in big letters on the cover. Now, I did not even know what QST meant, so how was I to know what this magazine

contained. He asked me to look at it, but I excused myself by saying that I did not feel like reading. So days, weeks, and months passed, until one day in June I went to see this fellow again. He asked me to read QST. So I began looking through a copy, and had hardly read one article when I demanded to see all the copies he had. To my great joy and delight, I found that QST contained ALL the things I wanted to know, and what is more, I found that it stuck to its subject.

I want to thank the editors and all the writers for their articles in QST. I am following the advice of Mr. Felix's article on Portable Wireless Sets, August issue, and I am using Mr. Lindley Winsor's hook-up for the oscillating audion in July issue. This hook-up could not be beaten.

I hope to be of some service to QST and the A. R. R. L. and wish you luck in everything that you do."

GOOD WORK.

Mr. R. H. Pray of Park Rapids, Minn., writes: "I noticed in QST the records of the different stations, and was interested. Mine seem to compare favorably, and I suppose the different stations will be glad to see their calls have been heard. From September 27th to November 19th, I heard one hundred different amateurs. Some of the distant ones are: 9IK, 8AEZ, 8NF, 8NH, 8ES, 8XA, 8AQ, 8AOI, 8AWA, 5ZS, 5ZE, 5DU, 5BV, 8KS, YJ, 8OH, and the rest, I believe, are in the ninth District. I have gotten some of these only once, but most of them several times. Besides the amateurs, I have heard fifty-eight other stations along the Atlantic and Gulf coast, in Mexico and the Great Lakes. I use an Audiotron bulb, with a magnet."

PLEASED WITH QST.

Mr. E. Cunningham of Champaign, Ill., writes: "Received QST O. K., and am very much pleased with it. Noticing that amateurs are sending in a list of the calls they hear, I am taking this opportunity of doing the same. The following calls

were heard at this station during the last two months, on galena detector and all came in QSA:—9NW, 9GY, 9LW, 9FW, 9KV, WS, GH, 9VY, 9ON, 5BV, 8NH, 9ABD, 5ZC, 8NQ, 9UK, 9MN, 8JY, 9AMI, 8PA, 9GJ, 9KG, 8AOF, 8YO, 9ME, 9GP, 9NU, 9IK, 8ASG, 9QR, 9AMQ, 9AEG, 9XV, 9HX, 9HQ, 9AKT, 9AKP, 9AZ, 9ACM, 5BB, 8AAK, 9FP, 9MQ, 9BA, 9RD, 8JZ, 9AMY, 5YG, 9RP, 9AWS, 9DV, 9UC, 9ZN, 9EP, 8OH, 9JI, 8CS, 9EG, 9PF, 9EU, 9KV.

I have heard quite a few stations calling me, but could not get their call. I would be very glad to hear from any amateurs who have heard GR."

QRM.
By 9DC.

The charm of a wireless station is beyond the description of man or beast. In a few lines, I will try to express my joys and sorrows in connection with this infernal "sparkin biznus."

As I sit here upon my hard-bottom chair, with receptors screwed to my auditory organs, I seem to be possessed of a super-human position. In fact, it is like flirting with spirits, chasing unimaginable demons of the firmament, and kidding the devil. Indeed, I listen to the mouth of the world give forth its grievances of a day, with ears like those of a God. As the hours grow smaller, the green shaded filament before my orbs appears to grow more subdued, but more effective with its tormenting rays. I am surrounded by the playthings of spirits. They generate a flaming liquid. It is hot. It cracks as it flows. It renders the air asunder as it passes over a non-metallic circuit (spark gap). It jumps forth from its origin upon every air line of the earth. It dies no sooner than born, but how far it has traveled in its short career, no one knows. Indeed, the most delightful and fascinating thought comes from the anticipation of reaching some distant hamlet or city, but alas, all hopes are shattered and driven into oblivion when buzzing into my head comes the msg. of a familiar spark situated not more than a few blocks away, informing me that he will see me in the

morning; that I come in O. K., etc. etc. Here I threw my switch. O. M. I have worked into the second district, about 800 miles or so, and no one knows, but POZ might have answered then. Who will dare put my thoughts of the spark coil into words?

GA, I will QRX and listen SK.

DO YOU HEAR 9ADT?

Hartmann Bros., of Wanwatosa, Wis., 9ADT writes: "The following is a list of stations copied lately at "9ADT," 9AAG, 9AMV, 9DU, 9IC, 9MQ, 9TA, 9ABE, 9ANQ, 9EG, 9IK, 9MS, 9UC, 9ABD, 9AS, 9JD, 9MY, 9VK, 9ABW, 9BA, 9EN, 9KY, 9NC, 9VY, 9ACO, 9BD, 9FW, 9KV, 9NN, 9WC, 9ADV, 9CE, 9GU, 9KS, 9OE, 9WT, 9AIV, 9CF, 9GY, 9LT, 9RD, 9WW, 9AKP, 9CU, 9HQ, 9LP, 9RP, 9XE, 9AMI, 9DB, 9HU, 9LR, 9RW, 9XN, 9AIB, 9BV, 9HX, 9MA, 9SP, 9XR, 9ABA, 9HK, 9ME, 9SQ, 9YA, 9ADA, 9YO, 9ZL, 9ZS, 9XM.

Heard since Oct. 1:— 8ACK, 6SH, 5BB, 8AEZ, 5BD, 8ASG, 5BT, 8KF, 5BV, 8NH, 5DU, 8SK, 5ZC, 8XA, 5ZM, 8YO.

5BV, 5DU, and 8AEZ come in exceptionally loud. 6SH was heard in the presidential relay of Oct 27.

Any stations hearing "9ADT" would confer a great favor upon us by dropping a card."

IS YOUR CALL LISTED HERE?

Nelson Dunham, 2ALI, of New Brunswick, N. J., writes:—"The following list contains some of the stations outside of the Second District which have been heard at 2ALI during the past six weeks. These stations were heard while using only a single audion.

1IZ, 1VN, 1ZL, 1ZM, 3AFA, 3IE, 3RO, 3SZ, 3ZH, 4AA, 4AC, 4CK, 5ZM, 8AAK, 8AEH, 8AEZ, 8AID, 8IQ, 8JY, 8KF, 8NH, 8NW, 8PA, 8PC, 8PM, 8RS, 8VX, 8VY, 8XA, 8YL, 8YO, 9AAB, 9AAK, 9AAR, 9ABD, 9ACM, 9AEG, 9AIK, 9CA, 9CF, 9CS, 9DK, 9DV, 9GE, 9GJ, 9GY, 9HQ, 9HX, 9JI, 9LE, 9LR, 9ND, 9NN, 9NQ, 9PC, 9VY, 9WC, 9WD, 9WI, 9ZL, 9ZN (Not listed).

I hope this list will not arrive too late for publication in your next issue."

"CAN'T DO WITHOUT QST."

Donald W. Balson of Oberlin, O., 8AEH, writes:—"Please renew my subscription as it's simply impossible for me to be without QST."

Noticing that you would like to have more lists of stations heard, I am sending you a list of stations I have heard so far this season—1ZM, 1IZ, 1ZL, 1ZD, 1VN, 1HJ, 2AGJ, 2ABG, 2LK, 2DA, 2OJ, 2JU, 2PH, 2JD, 2ZP, 2PM, 2ZS, 2ZV, 2IB, 2CE, 2FC, 2IM, 2ABJ, 2OB, 2CB, 3TU, 3GG, 3UF, 4AA, 4CK, 4DI, 4DG, 5AM, 5AX, 5DU, 5BV, 5DM, 5ZC, 5ZM, 9BD, 9DB, 9BC, 9ABD, 9AAB, 9BA, 9ARS, 9TA, 9VY, 9UY, 9WF, 9GY, 9IK, 9AMI, 9AP, 9IC, 9HQ, 9JO, 9LR, 9PC, 9AI, 9AKP, 9XN, 9YI, 9AC, 9JI, 9RD, 9FY, 9RW, 9QI, 9ARD, 9AIM, 9AMT, 9NN, 9VP, 9AB, 9AU, 9YO, 9MQ, 9HC, 9KA, 9PF, 9QJ, 9EG, 9DM, 9LT, 9GJ, 9DK, 9ACM, 9UC, 9GE. I did not put in any stations in the 8th District as it would fill the rest of page. hi.

The stations I have worked with or who have reported my sigs QSA are—2AGJ, 2JD, 2JU, 2PH, 2CE, 2RB, 3UZ, 3WN, 4AA, 5DU, 9ABD, 9EP, 9GJ, 9UY, 9BV, 9VY besides many stations in my (8th) district.

Hope this will be of some value to you."

HEARD IN DES MOINES.

Mr. James R. Allen of Des Moines, Ia., (9EU) writes: "Knowing you are always interested in long distant work, I thought I would tell you of the stations heard here since September 1st to January 1st. If any of these stations wish to know more about how they came in, please write me.

8YO, 8AEZ, 8NF, 8NH, 8AES, 8DH, 5BV, 5ZC, 5DU, 9AMA, 9UA, 9TZ, 9AMF, 9HB, 9AKP, 9ABD, 9MQ, 9AIK, 9MA, 9AAU, 9BW, 9JH, 9AEG, 9JL, 9MC, 9HG, 9AW, 9JW, 9HQ, 9AMI, 9AZ, 9HX, 9DH, 9RW, 9NN, 9ZE, 9BA, 9HU, 9ZL, 9ZF, 9XR, 9TR, 9HS, 9CP, 9FP.

I might say that most of these stations

were copied on crystal, while some on an electron relay bulb.

Any station hearing my sigs. will do me a great favor by notifying me."

FIVE YEARS AT IT, AND STILL INTERESTED.

Mr. Hoyt S. Scott, North Fairfield, Ohio, 8LE, writes:—"I have been doing fairly good work this winter, having received letters from seven different states, saying my sigs. were QSA. That was with $\frac{1}{2}$ K. W. Thordarson. Now I have sent for a 1 K.W. Thordarson, which I hope to receive soon. Perhaps then I can make a bigger splash in the ether. I enjoy very much looking over the list of amateurs which are heard, and am enclosing list of a few I have heard very QSA.

2ZV, 8ASG, 9EG, 8YL, 9HX, 8YI and 3ABG. These are the only ones I have kept a record of. If I can do anything in the line of relay work this coming winter, don't fail to call on me, as I will do the best I can. I have been in the game five years, and each day is just as interesting as the first day."

"COMMENTS ON QRM."

E. B. Duvall and Alan P. Smith, 3rd, of Baltimore, Md., writes: "Mr. Smith and I wish to thank you for your "MASTERPIECE" in the JANUARY ISSUE OF "QST" as it certainly is a wonder. We also take particular notice that the issue in question seems to be the "QRM" number, and we wish to say a few words on this question. First, we would like to suggest to the makers of OUR little magazine, a future copy—containing nothing but suggestions, criticism, articles, etc., on the vital subject which has been called to the attention of us all.

Through our association here, we have eliminated the local QRM to a minimum, but of course, there still are a few who perhaps unknowingly play havoc with their spark coils, which are neither tuned in wave or spark tone. These little fellows are the unlicensed amateurs who cannot read even five words a minute, and

are non-members of the Association. These fellows are the ones we have to get to, and it has come up before our Association many times. Just what to do is the main question, and we will appreciate any suggestions offered by our fellow relayers. As the question of late relay working is impossible with some of our good stations here in Baltimore, we are obliged to send out QST's, QRX's and QRT's in the early part of the evenings so that things are quiet after 9:30 or 10:00 P. M. Our members know when to stop when told, and it is hardly ever necessary that we have to call some member down for working during Relays. Long distance QRM, is beyond our control, and we think everyone will agree to that. The only way we can ever cut out long distance QRM is to design apparatus which will tune out the QRM. We think such apparatus can be designed to some extent and it is up to our brainy experimenters to work such problems out.

As our Trunk Line Manager, Mr. Hebert was so kind to point out, in his report in the January issue, the work being done in this city has progressed greatly in the past few months. Several tests were carried on during December with 3AEP, at Philadelphia, Pa., 3QZ at Bala, Pa., and several stations in Wilmington, Del. Much to our regret we were unable to obtain any satisfactory results, but we expect to have a few more trials before the season is over and we hope for the best result. We seem to have a very good connection between Baltimore and Washington, D. C., and the writers have reason to believe they have been in touch with 2LK (New York City). They have had communication with Buffalo, N. Y., through 8VX, so that goes to show the signals of the Baltimore stations were going somewhere. We might mention that some very good long distance receiving has been done by 3ATR, 3SV, 3KS, 3KC, 3AOH, 3AMP, 3RS, 3QV, and a host of other Baltimore Stations. These stations have also made some very good records in transmitting, and the only thing which remains, is that we all be given a chance to get in on some of the future Relay work on our Trunk Line. We can only promise our loyal support and our assurance that we are always ready for

anything that comes our way. I might say that some of us have felt rather hurt that messages have been passed right over our heads from the Northern and Western stations to the South, when they could have been handled through Baltimore, but we were not even given the chance. This probably was because we were not universally known on the relay map.

The list given herewith, are a few of the stations which have been copied during the past two months by the writers:—1ZL, 1ZM, 1ZW, 2ABG, 2LK, 2JD, 2ZP, 3ZW, 3GS, 5BV, 8AEZ, 8NH, 8VX, 8IK, 8NF, 8XA, 8YL, 8AAK, 8PA, 8ALE, 8WF, 8KS, 8ZW, 9PC, 9NN, 9UF, 9ON, 9NU, and WPP (Dr. Hudson at Wilmington, Del.) 2LK and 8AEZ being the loudest of any heard. We have copied a good many more 8ths and 9ths, but a great many of our log sheets have been mislaid.

Anyone copying our signals QSA will do us a great favor by dropping us a card, and we can assure all will be promptly answered. We have sent many cards to those we have heard, but have never received replies. Of course we did not send cards to all those we have heard, but send them to those we get unusually strong.

Trusting that our QRM comment will be taken up by all and wishing QST and fellow amateurs the best of success, we remain,"

WINNETKA, ILLS.

Mr. Kent T. Healy of Winnetka, Ills., writes:—"I have arranged my set with the regenerative hook-up. The results are amazing. Without the wing inductance, I am able to read WGO, 9ZN and the spark set at NAJ, thirty feet from the phones. I find only clear toned, smooth sparked stations can stand the amplification, and still be readable. I have taken my rotary gap out, and have been able to send fifty miles at mid-day, with a straight gap.

I have heard the following stations since I have been on regularly: 9DS, 9VK, 9SD, 9AAG, 9UI, 9NN, 9DU, 9KD, 9PK, 9EU, 9BZ, 9AS, 9UK, 9IC, 9AGO, 9LO, 9DF, 9MY, 9AU, 9UT, 9MV, 9AL, 9AK, 9AI, 9BD, 9OD, 9DV, 9SP, 9RG, 9QZ, 9RS, 9BB, 9DK, 9NU, 9BQ, 9NS, 9IR, 9BY,

9ON, 9AQ, 9AAD, 9UN, 9IM, 9JK, 9IU, 9BV, 9SK, 9KH, 9FF, 9II, 9ZS, 9ZI, 8AEZ. I have omitted those nearby.

Of all the wireless periodicals, I have perused, I have learned the most from your publication. QST is to amateurs, as the Wireless Age is to commercial operators, except that QST is more practical."

FROM GUS. B. POSTON, SAN ANTONIO, TEXAS.

I have received a copy of your QST magazine, and on looking it over, I find that is "some" magazine, the one piece of literature which delivers its message good and proper. And I want to say right here, that it is the best piece of encouragement we "Radio insects" have ever had among us. But here I must squeal my tale of woe before I go too far.

One fine winter's night in last March, two of our enthusiastic bugs exchanging confidences via Radio. On that same night, a test of the efficiency of the amateur stations was being conducted by the U. S. Government, direct from Washington, unknown to these boys, who continued their conversation until well nigh midnight, when each said good-night. Little did they know that on the following day they were to be arrested. So each slept peacefully, arising next morning only to make the situation worse by spreading the news that there had been interference to other amateurs. The result was, that every amateur who had heard even the least word of it, was busy at his instruments the following night that he might have a hand in "it." So what should Uncle Sam do, but order every station in this city dismantled, regardless of license, size or purpose, and even now, while other amateurs in neighboring cities are busily engaged in conducting experiments, we must not touch an instrument. Do you think it is fair that we should be held down? Is it just? If so, why? Just because a couple of operators raise a disturbance, is that any reason why a hundred or more of us should be put out of the amateur circle? Why not punish these two intruders and let that settle the trouble? If we could only work our sta-

tions, your League would certainly profit by it, as there are at least a score of operators I know of, who would be delighted to join the American Radio Relay League. I for one, would be more than willing, as I have had four years experience in radio work.

So, Mr. Editor, don't you think you could use your influence and help us out? If it is necessary, I could give you the names of the operators who would be willing to join your League.

If you desire to do so, you may publish this letter—But won't you please answer me personally. Anxiously awaiting your reply, I am," etc.

RELAY NEWS.

Mr Lindley Winsor, 6ZW, of East Bakersfield, Calif. writes:—"What I believe to be the first eastern Relay League message to reach California, came through to me last night from 6DM in Phoenix, Ariz., and reached its destination, Los Angeles, at about 10:00 p. m. This message originated at 8ZF, Cincinnati, and show having been relayed via 9XN, 9ZF, and 6DM. It bore no filing date, and therefore I have no means of knowing how long it was on the road, except that 6DM received it from 9ZF on the night of the 13th. I was so excited over the event, that I immediately filed a message addressed to you, and shot it to 6DM, and received an acknowledgement. I am wondering when it will complete the route.

In regard to the practicability of this route for regular traffic, I think it is the most feasible of any at the present time, as I can receive almost anything from Phoenix, as there are two stations there now, 6DM and 6FD, with whom I can practically always communicate. The weakest point lies in the stretch between Phoenix and Denver, but this may be used as an alternative with Phoenix and 5DU or 5ZC in Texas. Communication has not as yet been established between the latter, and Phoenix, but 6FD reports their signals strong, as also those of 9JW, and I am momentarily expecting to hear that they have got together. With the choice of three routes, there should be no trouble

in maintaining first class correspondence between the two coasts.

I am planning a thorough going over of my transmitting equipment (a chronic state with most of us I think) with a view of establishing better communication with San Francisco and nearby places. This is where I seem to fall down this season. The receiving from there is great, but nearly every message I have handled for the north, has been hung up on account of their not being able to copy me through the QRM and fading. I have four on the hook right now which stalled on me last night.

Keep up the good work in the fight against QRM. We must do something definite before long, or relaying will almost have to be given up. I am not bothered at all by local interference, as there is not an audible amateur within a hundred miles, but I certainly have my share of trouble from the long distance hogs who stay on the key all night, calling and chewing the fat with every "L. D." station they can raise. The worst of it is, some of these fellows who do this the most, have the most efficient stations, and while they are sending, it is next to impossible to read any one else. I have no objection to an occasional chat, or a long distance call to test the range, as I do it myself, but for the League's sake, be moderate and don't do it on relay nights.

I received a letter from Dr. She'ton, CSR, a short time ago, saying that he was giving up the wireless game to take up other lines of research. We are losing a real relayer and a thorough experimenter when he drops out. His work with the oscillating audion and aeroplane wireless is especially notable. I notice he reported in last month's QST, hearing 9JW over a distance of 1600 miles. I hope my relay reaches you before this letter and that this route will live up to its promise. 73."

YOUR POWER?

Here is a stunt that may be of use to amateurs.

To determine power in watts consumed by a wireless set if the house watt-hour meter is a G. E.—90% of them are—tie the key down, and count the number

of revolutions the disc in the meter makes in one hundred seconds, multiply this by 36, then by the number marked on the disc in black ink thus ($K = 5$). The result is the watts load. If you cannot see the constant on the disc, write down the data on the name plate, and phone the Power Company's meter dept., giving data and asking for "test constant."

SPARKS.

Mr. G. L. LaPlante of St. Anthony, Iowa, writes: "I thought you might be interested in knowing that I had some experience on New Year's Eve, with sparks jumping from my aerial to ground. This is the first time I have had it occur, although I have read of several fellows experiencing the same thing.

I was listening in during the worst part of a sleet storm, and noting that the static was very bad, drowning out everything, I cut out the set and started to connect the aerial with the ground. As the contact was made, I noticed a spark. By holding the aerial connection about $\frac{3}{4}$ " from the ground, a spark would jump across at about five second intervals. In five minutes' time, the jumping increased and finally a steady stream was jumping from the aerial to ground. After I started home, I noticed a flash of lightning, and as I was going in the gate, there was another severe flash, but the thunder that accompanied this one, was high in the air, and it did not ground. I wonder if any of the other fellows experienced this effect on New Year's night, or any night this winter?

Please note that I have bought a Clapp-Eastham Hy-tone 1 kw set, and as we will have continuous current in about ten days, 9KT will get back to the old schedule again. I have not been on much this winter, as we were pulling several stores, and when I used ten amps. it caused severe flickering of the lights, but a high line is now in, and we will shortly be connected to it with twenty-four hour service."

SUGGESTIONS FOR KEEPING RECORDS.

Mr. Henry J. Murphy, 1PX, Florence, Mass., writes: "Enclosed find card showing the method of checking different stations heard at 1ZL. Perhaps there is such a system in use now, and if so, this will be of no avail for the purpose for which it is intended, i.e., as a help in answering the correspondence of those amateurs who write in asking whether their signals have been heard.

We copy the log in the course of the evening's work, on a sheet of note paper, afterwards typing it on a larger sheet for the log book. At the end of the month, the total hours of operation is entered on the last day's card, with the total of messages handled, in four lists: north, south, east and west. The card, which explains itself, is copied from the log book and filed until the end of the month, where it is easily accessible. The cards are then transferred to a cabinet for future use.

I think this will be of great help to those who have a large correspondence, and wish to have a quicker method of reference than that of referring to the log book.

LIST OF STATIONS HEARD AT 1ZL.

Operator "HM"

Date January 16

Stations Called	Stations Signing	Remarks
1ZL	1MO O	7:25
1ZL	1ZM t No. 1	8:20
	gv him No. 1-2	8:30
QST	8XA qsa c'd	route rt
1ZL	1ZF	8:45
8OU	8KI	
1ZL	8AAK	9:15
1ZL	9PC	9:20
1ZL	8XA	9:25
8EG	9AIM	
8ZC		9:45
8MY	8XA	
8PA		9:15
1ZL		10:30
8UF	8ZX	10:15
1ZL	8QK	11:35-11:50
2ZP	1ZW t No. 1-6	11:50
	1IZ	

Operating hours 6:00—11:50.

five hours and fifty minutes.

Number of messages handled—
south 1—3 east 1—6 total 9.

CONDITIONS ON THE PACIFIC COAST.

Mr. Leander L. Hoyt of Hayward, Cal., 6SI, writes: "Most excellent work is being done on this coast at the present time, and we are expecting to do better later in the season. Trunk Line "F" is a success from San Diego to San Francisco, but the scarcity of good stations north of San Francisco leaves things in a bad way. It may seem peculiar that amateurs around San Francisco Bay cannot work up north as well as they work south, but it's a fact nevertheless. Consult a relief map yourself and you will agree that we do SOME work considering the mountainous country over which we work.

But, amateurs around San Francisco Bay are now working 6DM, Higgy of Phoenix, Ariz.,—not every night, but say two or three times a week anyway. That is nearly seven hundred miles direct over very mountainous country and dry desert land. THAT means a trans-continental chain now from Frisco over trunk line "F" and "E" to—well, practically anywhere now. Mr Higgy did a blamed good thing when he landed in Phoenix and shot up his "4x5's" and buzzed away. Through his action, let us hope for CONTINUOUS CONTINENTAL COMMUNICATION.

Let me say that the San Francisco Bay district is not free from interference,—far be it from such. But, I am trying to start a movement among the amateurs to stop short distance "hamming" after ten o'clock each night, except Friday and Saturday, so as to leave some time to long distance messages and tests. UNLESS WE CAN GET TOGETHER AND DO THIS, LONG DISTANCE WORKING OUT HERE WILL NEVER BE CERTAIN AND WILL ONLY BE CHANCE WORK. The sooner some thing is tried out, the better for us all. When you consider the fact that it is possible for me to hear over one hundred and twenty licensed stations, all of which are within thirty mile radius of my station, I speak of amateurs, not commercial stations,—will realize that we work with great difficulty over long distance. I enclose a small map showing the principal stations working long distance, and their "QRM" circle. When any one of these stations work, it's "good-night"

for any one to work if within the circle.

I have received word from 5DU of Dallas, Tex.—Emerson—, that he will make tests every Friday at 6:00 a. m., and try to raise 6DM and 6EA, 1700 miles. I recently reported that I heard him, and wrote to him. That was January 6th, and he states he was on at the time and called and worked the stations I heard him working. So now we are going to make a regular test and I think we will not be troubled with QRM, at least not on 200 miles. So, I'm hoping for his success."

RADIO STATION 1DX.

Havemeyer Road
Stamford, Conn.
Feb. 2, 1917.

Hiram P. Maxim, Esq.
550 Prospect Ave.
Hartford, Conn.

Dear Mr. Maxim:

I have actual proof to back up the statement of our relay league that in time of war amateur stations would prove of great value to the navy and army departments.

On the tenth of June, 1916, there were four U. S. battleships off Stamford harbor. They were here while Stamford was having one of her patriotic celebrations. The ships sent one of their portable stations to the shore in order to establish a means of communication between land and ships. (And it so happened that they didn't get in communication with each other until it was nearly time for them to depart.) Well, in the evening of the above date both the ships and the shore sets were trying to get each other, but nix. It happened that one of the steam launches which belonged to the Michigan got a hole in her bottom and had to be beached. The stations on shore was doing her best to get word of it to the Michigan but absolutely nothing doing, so in a last attempt the operator on shore called me up on the phone and asked me if I would QSR a rush msg for him to the Michigan, I of course said yes and proceeded to call her. The South Carolina

heard me and told the Michigan. I then gave her the msg and a little while later she told me to QTA it to the S. C. The Michigan also had a msg which she requested me to forward via phone to the land set, which I did.

The next morning I went down to see the land set and the operator was fooling around with a cat whisker detector trying to hear the ships. They were here about five days and they didn't get in communication until about the last day or two, and then it wasn't very reliable judging from the way they had to repeat.

If you think the above incident would be of any use in helping the amateur cause you may use it in the way which you think would be the most advantageous.

Yours very truly,

Stuart Sandreuter.

P. S.—The time I forwarded the above msg was at 9:27 P. M.

UNIONTOWN RADIO ASSOCIATION.

The Uniontown Radio Association held the first meeting of the season at the club room in the Uniontown High School, Oct. 25th. After a short talk by Prof. D. H. Conway, the following officers were elected. Pres. Fred McMullen; Vice-Pres. Robert Sincos; Sec. Selwyn Gay; Treas. Tom Hunt; Station Inspector, Fred McMullen and assistant, Jack McKinley. There has been a great deal of interest displayed in this section and the club has a membership of seventy-eight. Talks at the various meetings were delivered by Dr. Larkin, Prof. A. W. Wright, C. M. Chappening, Henderson Lynn of the American Manganese Co., Fred McMullen on various wireless instruments and the adjustments of the open and closed oscillatory circuits. Meetings are held Thursdays P. M., and experiments are performed with the apparatus kindly loaned by the High School. The club would like to hear from other clubs. Address all communications to Fred McMullen, Fairchance, Fayette Co., Pa.

Department of Defense

Continued from page 24

willful interference to the radio inspector, and when other means fail, it is perfectly fair and best for all concerned to use that method to eliminate this selfish type from the amateur field.

Another excellent idea carried out by Mr. Hebert is not to answer a station without an official call. This makes it possible to deal with intentional interference.

WHAT WOULD YOU DO IN AN EMERGENCY?

No matter how much care and skill you employ in the operation of your station, unexpected emergencies arise. If your station is an essential unit of the relay system, and you are unable to secure outside assistance, how are you going to meet such emergencies and have your station in working condition in a few minutes?

What would you do:

If all your telephone receivers burned out?

If your condenser punctures?

If somebody is stunned by an electric shock?

If you have a good way of handling such conditions, which arise quite frequently, just send the answer to:

Edgar Felix,
Department of Defense,
130 East 19th Street,
New York City.

All good answers will be published.

Professor Taylor Believes in Short Relays

Continued from page 18

cuse for such a large gap.

I have also frequently noticed that the stretch between here and Chicago is a particularly difficult one. It is much easier for us to work Dallas, who is twice as far away. We have recently completed some tests with NAJ on waves of 1200, 2400 and 2900 meters, which indicate some peculiarities in the transmission in the direction of Chicago, even on long waves.

Who's Who

Continued from page 30

who gave him many practical hints and pointers gaining him much valuable time which is usually spent by the average ham in wasted efforts and hard luck experiences. He has never attended a "Ham Factory;" choosing instead, to perfect himself as an operator through his own efforts and the experience and advice of others until his tireless efforts have finally brought him to the front in the amateur radio world.

The spark of 6AGW has been heard for several hundreds of miles up and down the Pacific Coast, the call however, being more widely associated with long distance amateur receiving. Aside from freak distances all the largest relay stations on the Coast and as far east as Denver, Colorado are regularly picked up. At the present time he is not able to actively engage in the relay work due to the fact that the "Light Co." refuses to furnish his Thorndarson with the necessary juice which is most necessary to quench the transformers thirst in order to keep it alive and on good terms with the distant stations. The fact is that "Babe" and the manager of the Co. supplying his thirsty "Closed Core" with the necessary "Zaz" are on the same supply line, which accounts for the action taken to prevent the lights in that worthy's house from automatically going on and off. To remedy this dreadful calamity he has already started the Co. "purring" as suggested in a previous issue of the "QST" and his friends on the coast may soon expect to hear again the well known spark of 6AGW.

RADIO CLUB OF NORTHPORT, L. I.

The amateurs of Northport, L. I., met at the station of H. A. Soper, and organized what is known as the Northport Amateur Wireless Association. The following officers were elected: President, W. A. Strawson, Jr., Secretary and Treasurer, H. A. Soper. The Club has now nine members, and is growing rapidly.

Code practice is given for those who desire it. Meetings will be held every Saturday night at 7:45. New members will be welcome.



This new department has been opened up for the benefit of the readers of "QST". Letters should be addressed, "QST", care of The American Radio Relay League. The Queries Department, Hartford, Conn. The questions will be answered free of charge and as promptly as possible. The answers will in each case, appear in "QST", provided however, they are of interest to the average reader. We are not in a position to answer questions requiring a long, mathematical solution.

The Editor hopes to receive a large number of interesting questions for the next issue. He trusts that you will make your questions of general interest and will refrain from asking questions which you can answer by consulting the Radio Laws and the Call Letter Books. "QST" does not wish to pad this department out with a series of uninteresting, foolish, questions.

IN ASKING QUESTIONS PLEASE OBSERVE THE FOLLOWING:

Number each question.

Make an effort to state each question clearly.

Write on one side of the paper only.

John Kennedy, Ont.

- 1.—We are not familiar with the construction of the coil you mention, and are advised by the manufacturers that the information is not available for publication.

Conant Manning, N. J.

- 1.—How many photographic plates $\frac{1}{8}$ " thick 8"x10" coated on both sides with 6"x8" tin foil should I use with a $\frac{1}{2}$ KW Thordarson transformer; with a $\frac{1}{4}$ KW Thordarson transformer?

The capacity of one such plate is approximately .0006 mfd. If you wish to operate on 200 meters a capacity equal to 10 such plates in multiple will be sufficient for either transformer. In order to avoid breakdown when using the larger transformer, 40 plates should be coated, two banks of 20 in. multiple being placed in series.

- 2.—What is the wave-length of this aerial: 35 feet long, 60 feet high at both ends

lead in taken from the center.

The wave length of your antenna may be approximated by multiplying its length in meters by 4.7. In this case the overall length of your antenna is 67.5 feet, and the approximate wave-length 97 meters.

G. L. Carson, Pa.

- 1.—How many 1 inch secondaries should be used on a $\frac{1}{2}$ KW transformer?

You have failed to make yourself clear, and we cannot say that we understand what you mean.

- 2.—What kind and number of wire should be used on a 110 AC motor (5,000 R. P. M. Rotary)?

This question also lacks detail. Is it for use with 60 cycle current? What power is it? What make?

- 3.—Where can I get a list of Amateurs of the United States and their call letters? "Radio Stations of the United States" may be obtained from the Superintendent-

ent or Documents, Government Printing Office, Washington, D. C., at 15 cents per copy.

Paul Jeffries, N. J.

1—I would like to know if two thin glass jars coated with 3" of tinfoil would prove a suitable condenser for a $\frac{1}{4}$ inch spark coil and what is the transmitting wave length with the following instruments connected to the $\frac{1}{4}$ " spark coil: fixed spark gap, two leyden jars, and aerial 75 feet long, 40 feet high, lead in 10 feet, ground wire 10 feet.

If you expect to use the spark gap directly in the antenna the capacity of your aerial will no doubt be sufficient for your $\frac{1}{4}$ inch coil. The fundamental wave-length of your antenna is approximately 165 meters, and using the above mentioned arrangements your transmitting wavelength will be the same. It is doubtful whether a closed oscillatory circuit in connection with so small a coil would be successful.

Ross Carruthers, Ont.

1—We have carefully noted your transformer drawing, and are of the opinion that as far as magnetic leakage is concerned your transformer would be best as it is. If additional leakage is provided the transformer will draw less current. As it is now, sufficient leakage is provided due to the space between primary and secondary. If you wish a greater spark length it will be necessary to use more turns on the secondary. In this case enamelled wire may be substituted for the cotton covered.

E. B. Jockers, N. J.

1—We fail to find your letter of October 1st in our files, without which yours of November 9th means nothing. Sorry.

G. S. Earp, Va.

1—If you wish to receive amateurs, the length of your antenna including lead-in should not exceed 200 feet. A series condenser will be necessary for the shorter wave-lengths. The antenna may be loaded for the reception of the long-wave waves.

Myrl Priest, Minn.

1—How many sections of Murdock condenser shall I use with a $\frac{1}{4}$ KW Thorndarson transformer? How many 8x10 photo plates?

The capacity of a single Murdock section is approximately .0015 Mfd. See answer to Conant Manning above.

Loyd Martin, Calif.

1—Will a condenser made up of 18, $6\frac{1}{2}$ x $8\frac{1}{2}$ inch glass plates with tinfoil 4.5x6.5 inches be efficient on a $\frac{1}{4}$ K. W. transformer of 9,000 volts? If not what would be the right size? Also for $\frac{1}{2}$ KW.

See answer to Conant Manning above.

E. W. Maass, N. J.

1—Will a condenser made up of a number of plates of glass 8x12 inches charge and discharge more quickly or more slowly than one made of a smaller number of large plates?

If the capacity of the two arrangements is the same, the rate of charge and discharge will be the same.

2—How many plates of glass 2x3 feet covered on both sides with tin-foil 18x30 inches for a $\frac{1}{2}$ KW Packard with a rotary gap?

You do not state the thickness of the glass. If the glass is $\frac{1}{4}$ inch thick the capacity of a single plate would be approximately .00675 mfd, sufficient for the transformer. It would be best to use a larger number of smaller plates. See answer to Conant Manning above.

M. W. Baldwin, Jr., Me.

1—What is the wave-length of an inverted L antenna 75 feet long, lead-in 25 feet long, ground wire 40 feet long?

The fundamental of any antenna may be approximated by multiplying its total length in meters by 4.7. In this case the result is approximately 200 meters.

2—How many meters in a coupler the primary of which is 5 inches long, $4\frac{1}{8}$ inches dia. wound No. 26 double silk; secondary 5 inches long, 4 inches dia. wound No. 31 double silk?

If shunted by a variable capacity hav-

ing a maximum of .001 mfd., the secondary will respond to wave-lengths up to approximately 4200 meters, if that is what you mean. In conjunction with the above mentioned antenna your primary should respond to wave-lengths up to 2,000 meters or thereabouts.

- 3—Please publish a diagram for taking the taps from the primary of above coupler. I wish to take off a tap every turn for 10 turns, and then a tap off every ten turns.

A diagram is unnecessary. Provide a switch for single turns and a switch for the groups of turns.

- 4—If a tuner or coupler were put in series with the aerial and the regenerative tuner described in the December issue, could longer waves than 600 meters be received?

Not unless the secondary circuit is also loaded to accommodate the longer waves.

L. G. Avery, N. Y.

- 1—Why will not a spark coil operate on stepped down A. C. without a vibrator? This A. C. is obtained thru a small transformer.

Spark coils are designed for use on direct current with some means provided for quickly breaking the circuit in order that the rate at which the magnetic lines of force cut the secondary may be high. The rate of change of the magnetic field in the case of the 60 cycle current is too low.

- 2—Can the short-wave regenerative set (December issue) be used for waves around 2,500 meters with any success? If not, what changes are necessary and why.

No. It is intended for short-waves only. It will be necessary to use more inductance in both primary and secondary. The series condenser in the lower leg of the secondary may be done away with. The reasons are obvious.

- 3—What type of transformer, open or closed, will send farthest and why?

If both of them have the same efficiency, there will be no difference.

F. F. Lambert, N. Y.

- 1—Give complete hook-up for Godley set,

—detector and all; the size wire each variometer is wound with.

We are advised that this information is not available for publication.

Frank J. Bursik, Ills.

- 1—Is it possible to use a crystal detector instead of an audion with the Short Wave Regenerative Receiver described in December issue?

No.

- 2—What is wave-length of loose coupler whose primary has a dia. of $5\frac{1}{2}$ " winding No. 24 enamel $7\frac{1}{4}$ " long; secondary $4\frac{3}{4}$ " dia. winding No. 30 enamel $6\frac{3}{4}$ " long.

Shunted by a variable capacity having a maximum of .001 Mfd the secondary will tune up to 7,000 meters approximately. With an antenna having a fundamental in the neighborhood of 200 meters, the primary will tune up to 2,800 meters or thereabouts.

- 3—My uninsulated lead-in must pass a water and metal stove pipe at a distance of about 6 feet. Does this hinder in sending? If it does would insulating the lead help?

No.

Otis Minnich, Md.

- 1—Would it be good practice to construct a high voltage B battery by using zinc and copper strips separated by heavy blotting paper saturated with sulphuric acid?

It would be an interesting experiment, but we do not believe such a battery would give consistent service.

J. E. Squires, Cal.

- 1—May the regenerative set in December issue be used on 600 meters in conjunction with an antenna 300 feet in length?

If the inductances in primary and secondary are designed to accommodate this wave-length, yes.

- 2—Would it lower the amplification to use a loading coil?

No, not necessarily.

R. C. Barrie, Idaho.

- 1—What should be my receiving range with 3,000 meter loose coupler variable and fixed condensers, 2,000 ohm telephones, galena detector, aerial 63 feet

high, 75 feet long, lead-in 70 feet?

Assuming that you wish to receive from stations using 2 KW or more your day range should be 150 to 300 miles, and your night range from 200 to 2,000 depending upon atmospheric conditions.

2—My aerial is of antenium wire No. 14. Would you advise the use of No. 12 pure copper for a lead-in?

This will be satisfactory.

3—Is it possible to use an X-Ray coil for efficient transmitting?

Yes.

L. E. Frost, Mich.

1—Are radio waves both electro-static and electro-magnetic, or simply electro-magnetic?

Electro-magnetic.

J. I. Greene, Ills.

1—Could I use enamelled instead of double cotton wire as stated in the description of the short wave regenerative receiver in December issue?

Yes.

2—Could an audiotron be used instead of an audion?

Any "grid" vacuum valve detector may be used.

Francis R. Pray, Mass.

1—Could a modified form of Chaffee gap be used in a storage battery spark-coil set using the ordinary hook-up, to better advantage than a plain or quenched gap.

No.

2—Could a multi-layer loading coil be used in the regenerative circuit in the December issue? If so, what are the dimensions and necessary data for same?

Best results will be obtained with the single layer coil. If you wish to make the multi-layer coil, turn a slot 3-32 inch wide by $\frac{1}{2}$ " deep in the edge of a wood block 1" thick by 4" in diameter, and wind with 90 turns of No. 26 D. C. C.

3—Is the long coil in Fig. 25 of Mr. Godley's article a 3 slide tuning coil? Could it be used with switch points instead of sliders, and if so, how?

Not necessarily. Switch taps may be taken off every few turns in the usual manner.

4—Is the potentiometer connected in series with the wing of the Regenerative Circuit December issue to be shunted across the "B" battery?

It should be, yes. A resistance great enough to materially reduce the "B" battery potential when in series with the battery would also very materially resist the passage of the high-frequency currents in the wing circuit unless shunted by a variable condenser. In either case a path for the passage of these currents should be furnished by the use of a condenser around that portion of the resistance in circuit.

B. A. Baur, Mich.

1—What range of wave-length could be secured by substituting a 43 plate condenser for the one specified in the December article on "A Short Wave Regenerative Receiver" at the same time using a coupler for those wave-lengths.

A 43 plate condenser may be substituted. If you wish to also use a coupler in place of the one suggested the wave-lengths received will depend upon the coupler.

2—Is it true that the circuit above mentioned changes the tone of the spark so greatly as to make it difficult to read?

The circuit above mentioned changes the spark tone to a hiss for the greatest amplification. Under these conditions the signals are less easily distinguished one from another, and more difficult to read through static. Considerable amplification may be had however, prior to the change in spark tone.

3—By eliminating the variable condenser may the rest be used as a straight audion hook-up?

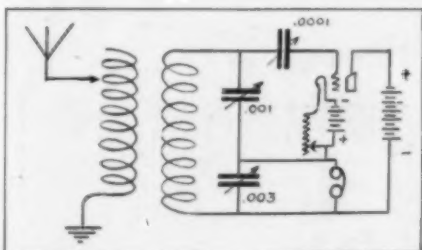
If the variable condenser were eliminated no means of tuning the secondary circuit would be available. To make a regular audion hook-up of this, connect the right hand side of variable condenser (with reference to diagram) direct to the filament instead of plate, eliminating the small fixed condenser.

4—Which winding of the two given, is preferable for use with an audion? Primary No. 24; Secondary No. 30; Primary No. 26, Secondary No. 32.

We cannot say that there would be any preference.

C. A. Mathiasen, Iowa.

- 1—Yours is a rather hazy letter. Can't say that we "get" you. Either a round or a tubular audion may be used for either damped or undamped waves. Below is a circuit diagram applicable to the reception of both.



J. J. Bueb, Jr., Conn.

- 1—You failed to enclose diagram mentioned in your letter. The coupling between primary and secondary of set described in December issue may be arranged so that secondary revolves inside primary. From your diagram, see answer to Mathiasen above, and insert your loading coils.

F. Oudin, N. Y.

- 1—For your diagram see answers to Mathiasen and Bueb above respectively. It will not be necessary to have your loading inductances in inductive relation to each other. They may be separated by 12" inches when standing vertically. You had best remove them entirely from the circuit when working on the coupler alone. For the longer wavelengths a .001 Mfd condenser may be filled with castor oil for use across the telephones. Its capacity may thus be increased 4.8 to 5 times.

R. C. Bender, Penna.

- 1—We note an error in diagram published in answer to your query in January issue. In circuit of first audion, point

marked D should be connected to the lower side of the .001 variable condenser, as well as to lower side of the .001 variable condenser.

R. A. DeVore, Ga.

- 1—For your diagram see reply to R. C. Bender both this and January issue.

NEW HAVEN RADIO ASSOCIATION.

The New Haven Radio Association elected the following officers at its recent annual meeting on January 2nd, 1917.

President, W. F. C. Hertz; Vice President, R. Merwin; Secretary, R. H. Campbell; Treasurer, A. P. Seeley.

Meetings are held every Tuesday evening in the Club room in the Y. M. C. A. building. The membership has increased to twenty-five since last spring, when the Club was started.

Communications should be addressed to the Secretary, at 365 Edgewood Ave., New Haven, Conn.

Inductance and Capacity Phenomena

Continued from page 9

is varied. Altho I have not worked enough with these multiple layer coils to recommend them for all purposes I see no reason why they should not be used extensively and would like to see others try them out. In the construction of them it is advisable to have many layers, the cross section of the winding should approximate a square, there should be a space between layers of a millimeter or more (the best spacing I have not yet worked out), and the space should be air (not dielectric like paper or cloth) so that the internal capacity may be small and so that there may be no dielectric losses or leakage between layers to impair the efficiency of the coil.



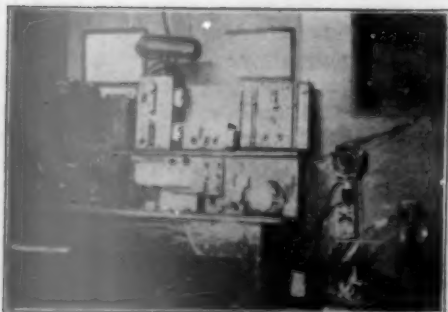
Station of F. B. Hanes, 9CI



Station 9CI in Lakeville, Ind., is owned by Mr. F. B. Hanes, who is not nearly as ferocious as he looks in the accompanying photograph. He tells us that the angry expression was caused by an outburst

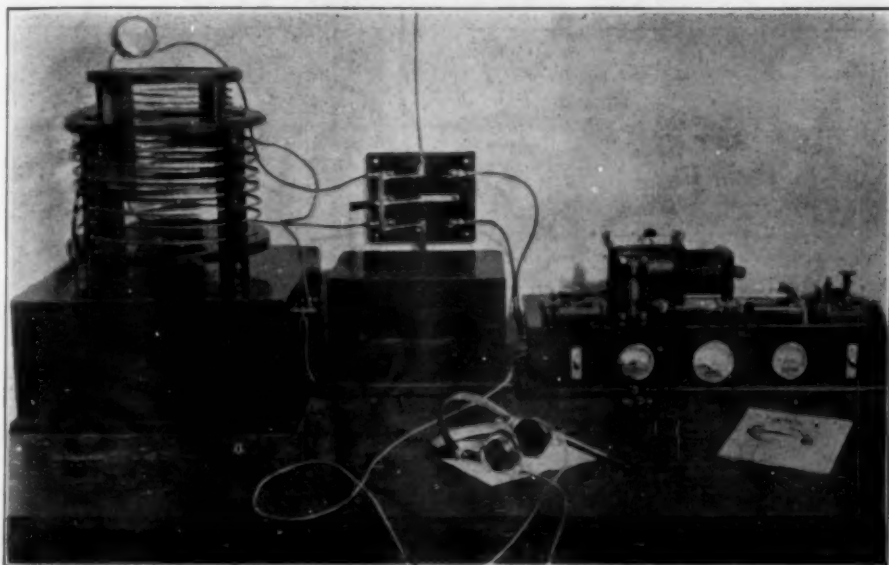
of local QRM just as his photo was being snapped. Mr. Hanes has an interesting home-made rotary. The remainder of the outfit is of the usual type.

9VY Radiates 8 Amps.



Mr. Geo. D. Bauer of Fort Wayne, Ind., is the possessor of a 1 K. W. Station capable of radiating 8 Amperes on 200 Meters. His aerial is 4 wires 80 feet long, and 60 feet high. The transformer is General Electric. The condenser is oil-immersed. Mr. Bauer uses a Halcun rotary and a very heavy home made oscillation transformer of the pancake type. The receiving outfit is equipped to handle all waves both damped and undamped.

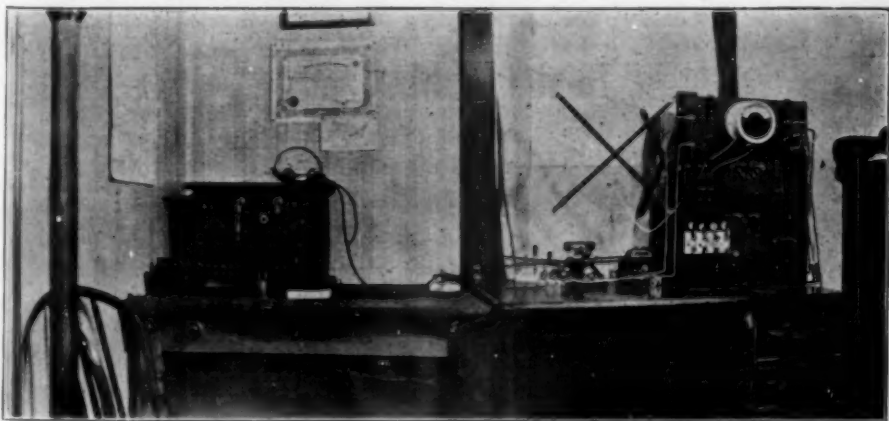
Special License Station 6ZD



Special license station 6ZD is located in Fresno, Cal. It is owned and operated by Mr. R. C. Denny, Vice-Pres. of the Fresno Radio Club. He has not had his 425

meter wave long enough to report on long distance sending, but has heard the Naval Stations in Key West Fla., and Cordova, Alaska.

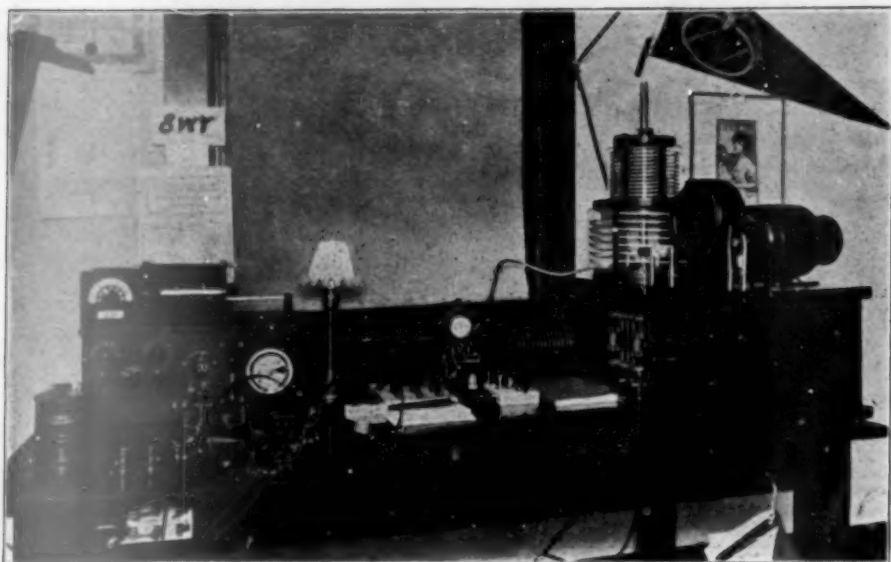
Salt Lake City, Utah



The accompanying photograph shows station 6SL in Salt Lake City. Mr. Cedric E. Hart designed and manufactured both the sending and receiving panels.

The input is 1 K. W. As it is a recent acquisition, he has not yet had time to try it out for long distance.

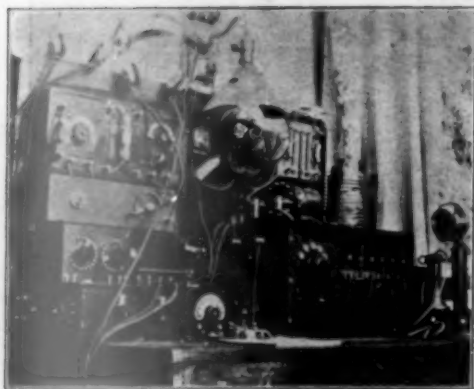
Long Distance Station 8WY



The good-looking set shown in the photograph herewith belongs to Howard O. Hardesty of Detroit, Mich. It is known as 8WY. The sending set is 1 K. W. The

receiving outfit contains a regenerative set for both long and short waves, with a mineral detector for stand-by. Mr. Hardesty can copy all the Coast Stations.

In the Y. M. C. A.



In Baker, Oregon, you will find this set. Mr. A. E. Wilkinson informs us that it is $\frac{1}{2}$ K. W. The spark gap may be recognized as Radio Apparatus make; the helix as home-made. The receiving outfit shown very clearly in the photograph, needs no explanation. The call is 7AU.

QST Subscription Contest

To many of the most enthusiastic amateurs, first class apparatus is an extravagance. With the idea of helping these amateurs, who may become prominent relayers, QST offers a proposition whereby reliable instruments may be earned by a little work at getting subscriptions. QST subscriptions may be had for the asking. Try it and see.

The one who sends in the largest number of subscriptions before May 19th, receives the first prize—The Paragon Short Wave Regenerative Receiver, valued at \$35.00

The one who sends in the second highest number, gets a pair of Amplifone Mica-Diaphragm Receivers, valued at \$25.00.

The third, fourth and so on up to the twentieth, receives the apparatus listed below. Look it over.

The conditions are not complicated. They are simply:—

1. Send in your name and address and we will send you some subscription blanks. To be entered in the Contest, your subscriptions must be sent in on these blanks. Be sure to write your OWN name on the back of each blank so that we may know who to give credit.
2. To be entitled to any of the twenty prizes, you must send in a minimum of 10 yearly subscriptions or their equal.
3. Any one is eligible, whether a subscriber or not.
4. Twelve credits are given for each yearly subscription. Short term subscriptions are counted in proportion. Renewals count the same as new subscriptions.
5. All subscriptions must be in this office before midnight of May 19th, 1917. If received later, they will not be credited.

Scores will be printed monthly in QST so that you will know how you stand compared with the other entries.

We will be pleased to tell you your score at any time by mail, send you more blanks, or help you in any manner possible. We solicit correspondence with the Contestants.

Address all communications to the Contest Manager, QST Publishing Company, Hartford, Conn.

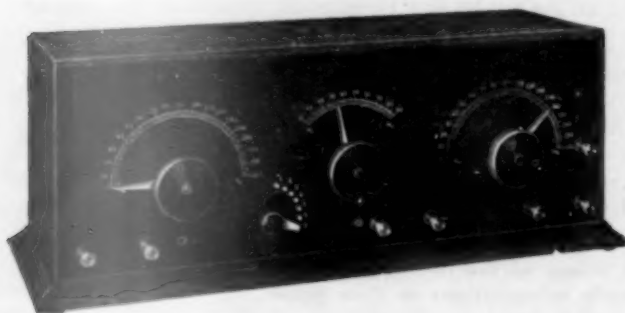
The price of QST is going to be raised to \$1.50 per year starting with the April issue, but subscriptions to be entered in the Contest will be accepted at \$1.00. This fact should aid you in securing subscriptions and renewals, either of which may be entered for any number of years. Use this fact when collecting subscriptions. Every one starts out with an equal chance. The hardest workers will be the winners.

LIST OF PRIZES

FIRST PRIZE.

"Paragon" RA-6 Amplifying Short Wave Receiver. Range 180 to 580 meters—Price \$35.00.

How many times have you had a signal fade out—and tried everything under the sun to hold it just one second longer? How about the stations you have never heard? Stop worrying because the fellow with the big antenna hears them and you don't! A little hard work will get you this tuner and then you will hear everything and furthermore you can "hold" the long distance fellows.



No Tuning Capacities, and No Switches In The Audion Circuits, No End-losses, No "Shorted" turns. Amplifications up to 100 times. Selectivity as great comparatively as the amplification. All amplifications obtained without change of spark tone. Covered by a 2-year satisfaction-or-your-money back guarantee.

SECOND PRIZE.

Mica Diaphragm Radio Receivers, Value \$24.00.

You could not wish for better phones than these—you will not have to wish for them if you have a little pep and a little time.



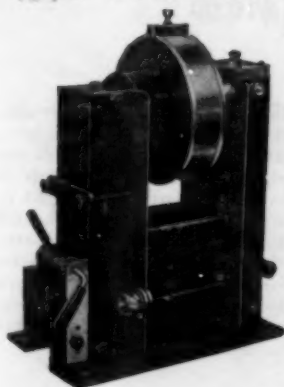
This receiver is of the watch case form and is especially adapted for service in wireless telegraphy and telephony.

The diaphragm is of thin mica, is very light and sensitive to the impulses from the armature. The diaphragm, armature, link and spring together weigh only a fraction of the weight of the common steel diaphragm.

The headband has many special features rendering it self-adjustable so that when placed in position on the head it will remain without slipping.

THIRD PRIZE.

$\frac{1}{2}$ K. W. Flexible Wireless Transformer, New Type—Value \$20.00.



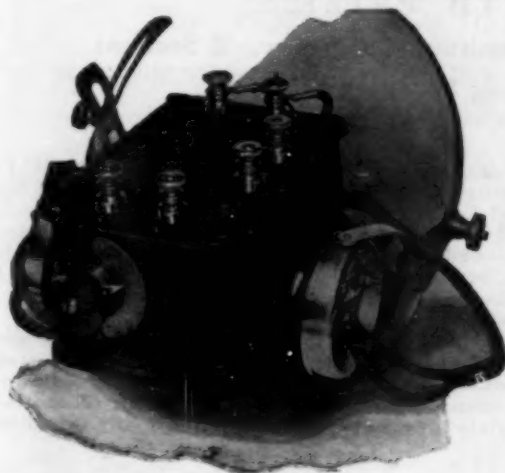
These transformers need no introduction. You could use one. Will you exchange a little work for one?

A Magnetic Shunt Transformer is particularly adapted for wireless work for the reason that it is practically a constant current transformer.

These transformers will make wireless apparatus 200 per cent. more efficient, consume no more power than is absolutely required to produce the best results at the desired regulation.

FOURTH PRIZE.

Multi-Audi-Fone, Value—\$18.00.



Do you want to increase the weak and inaudible signals?

Do you want to bring in the loud signals with a crash?

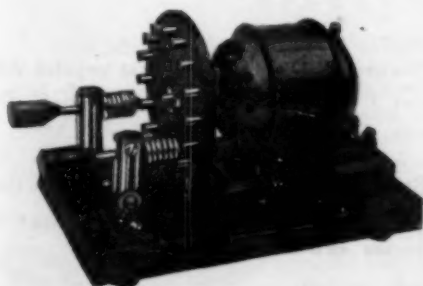
If so, you want this M. A. F. Here is your chance to get one. QST subscriptions may be had for the asking. Try it.

The Multi-Audi-Fone is an electrochemical amplifier that increases damped and un-damped radio signals many times their original audibility with any kind of detector.

This instrument will render audible many stations that you have never heard and wonderfully increases those that are audible but not readable with your present station.

FIFTH PRIZE.

The Radio Rotary Gap—Value, \$12.00.



—for use on sets up to 1 KW, sparking points are of brass—aluminum and zinc having been found to wear away very rapidly and also to liberate a gas that is detrimental to its transmitting ability. The base is of solid mahogany and all metal parts heavily nickel-plated.

A variable speed A. C. 110 Volt Motor revolves the $3\frac{3}{4}$ inch Bakelite disk carrying 12 studs (16 were formerly used) at a speed of 2,000 to 5,000 R. P. M., producing a clear crisp tone easily read through etheric disturbances.

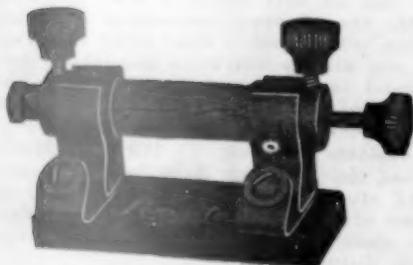
SIXTH PRIZE.**Precision Hot Wire Meter—Value \$10.00****"What are you radiating?"**

The Precision Hot Wire Meter of the highest grade, the case being of satin finish aluminum, plain glass, black figures on white dial, nickel binding posts, zero scale adjustment of novel design, the case measures 6 inches in diameter by 2 3/4 inches high, and the weight is three pounds. The inductance of the shunt circuit and expanding wire being properly proportioned, the instrument will read correctly on all frequencies. The resistance of the meter is very low in comparison with others of this type. A high resistance meter will so affect your circuit that the fine tuning necessary for maximum radiation and distance cannot be secured.

SEVENTH PRIZE.**Murdock Moulded Transmitting Condenser. 5 Sections****Value, \$10.00.****"Increase your condenser efficiency."**

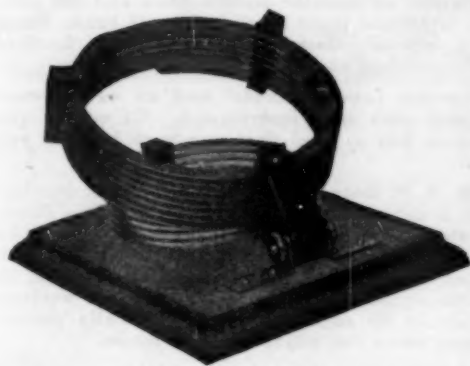
This condenser is made in sections of .002 M. F. capacity each. Size of each section over all, 6 3/4 x 6 1/2 x 1 3/16 inches. Conductive plates, copper sheet, totally enclosed. Dielectric, special moulded compound. Connection posts, copper terminals with brass nuts. Tunes to 1,600 meters without loading coil, and on a longer antenna to proportionally longer wave lengths.

The strength of the completed section is a decided advantage wherever apparatus is subjected to constant movement or frequent handling. In this connection, it has been found ideal for portable equipment, where fragile jars or plate glass capacities are frequently found impracticable.

EIGHT PRIZE.**Lenzite Wireless Detector—Value, \$5.00.**

"Lenzite is the best contact crystal detector I have ever tried." Signed: C. D. Tuska, Editor QST.

Recognized by leading authorities as the most sensitive and most effective crystal Detector existing.

NINTH PRIZE.**Murdock Oscillation Transformer—Value, \$4.00.**

This oscillation transformer will afford every private station the opportunity of securing an efficient transmitting tuning device which will permit that sharpness of tune required by radio regulations.

The primary consists of six turns of copper strip and the secondary of nine turns. The secondary is constructed so that it may be moved toward or away from the primary in variometer method. This is a decided improvement over the methods now in existence because this permits almost any degree of coupling.

The base is of mahogany. Size over all 10x7½x3 inches. Four clips supplied with the instrument.

PRIZES. TEN TO FOURTEEN.**Murdock "Fifty-Five" 2,000 Ohms Complete, 5 Double Sets,
—Value, \$4.00 Each.**

Detail: standard double pole receivers designed solely for wireless: Receiver cases, moulded hard rubber composition, with exceptionally handsome and lustrous finish, MURDOCK patented SOLID construction, making adjustment correct permanently. Magnets best quality steel in amount sufficient to insure dense and practically permanent magnetism. Spool windings, genuine copper, enamel coated. Diaphragm, wireless type, thin, flexible, non-rusting, correctly adjusted and seated. Cord, five foot length, mercerized finish, best quality. Head band, regular equipment, nickelled German silver, split and adjustable; receivers attached to band by ball and socket joint.

FIFTEENTH PRIZE.**Murdock Rotary Variable Condenser—Value, \$3.00.**

This condenser has a capacity of .0005 mfd., and will be found suitable for use as a secondary multiple condenser for the average wave lengths. It is in every way, a handsome, splendidly operating instrument and offers the best value obtainable for the price.

Detail: 11 movable plates, 12 stationary; transparent case; hard rubber, composition top with scale. Size, 4 inches diameter, 2¾ inches high.

SIXTEENTH PRIZE. M. A. F. Detector Stand—Value, \$3.00.



It is perfectly flexible.
It is air-tight.
It is practically permanent.

The base is of genuine hard rubber and the mineral cup is turned from a solid piece of brass, fitted with our specially designed binding posts, finished in highly polished nickel.

We furnish fuseable metal and an extra sensitive crystal with each instrument. Of course you can fuse in any crystal that you may have if you prefer it.

The M. A. F. Detector Stand is the latest development of a detector stand and has the three essential points desired in a mineral detector, that is an air-tight chamber which will prevent dust from collecting on the mineral thereby detracting from its sensitiveness; also a detector which, while perfectly flexible in its adjustment, is practically permanent when once the adjustment is made.

All of these essential points are taken care of in our new stand.

SEVENTEENTH, EIGHTEENTH, NINETEENTH AND TWENTIETH. Edelman's "Experimental Wireless Stations" and a one year's Subscription to "QST"—Value, \$2.50.

Edelman's "Experimental Wireless Stations" is written so any amateur can understand it, contains exact dimensions. Tables and illustrations cover all modern Radio Apparatus. Undamped wave sets, audion hook-ups, oscillating and amplifying circuits are all given in detail.



This is the ideal book for the enthusiast, is recommended by us and endorsed by Radio Inspectors. One of the best books of its kind.

"Experimental Wireless Stations"
1916 Edition
272 Pages

Completely Illustrated

"COME ACROSS WITH
THAT SUBSCRIPTION
QUICK! TH' CONTEST
CLOSES
TO-MORROW!"



•BAM•

FOR SALE & EXCHANGE



FOR SALE—One inch spark coil, \$1.75. Pair Brandes 2,000 ohm phones, \$3.75. Large 5,000 meter loose coupler, Navy type, hard rubber cabinet, \$8.00. Any one having, variables, or type A Crystalloids please write, Chas. E. Littlefield, 2632 Mansfield Place, Sheepshead Bay, N. Y.

BARGAIN—3,500 meter NAA loose coupler, \$3.75; 1,500 meter receiving transformer, \$2.50; Type O Crystalloids, \$1.50; brand new E. I. Co. fixed variable condenser, \$.75. Instruments all guaranteed to work O. K. S. W. Pierson, Carrollton, Ill.

BARGAIN—One quarter Kw. Clapp-Eastham Company blitzen transformer, 25 cycle. Cost \$22., will sell for \$16.00. Address H. W. Woodmansee, 214 Morris Ave., Buffalo, N. Y.

FOR SALE—Used phone transmitters, \$50; magnetoes, \$.75; desk phones, \$1.50; 2 MF condenser, \$.50; Radio Call Book of World, \$25; \$26. Melophone horn, \$12! two inch electric train outfit, wood ties, steel track, two engines, and switches, \$5.00. Also want Multi-Audio-Fone and 25 cycle closed core sending transformer. H. C. Hubinger, 711 Fulton St., Keokuk, Ia.

FOR SALE—Blitzen ¼ Kw. transformer. Perfect condition. All communications answered. J. A. McHugh, 23 Woodland Place, White Plains, N. Y.

FOR SALE—Two-step amplifier and audio detector combination set, Navy type short wave loose coupler, and complete 1 Kw. transmitting set in use at 8EG. Write for particulars. L. A. Gebhard, 1127 Ellicott St., Buffalo, N. Y.

WANTED—December 1915, January, March, April, May, June, and September, 1916, issues of QST. Must be in good condition. Address Harry Wilcox, 147 Oakland Terrace, Hartford, Conn.

EXCHANGE—Postal Card electric projector, making space five feet square and officer's bugle, to be exchanged for Murdock hinge type oscillation transformer or hot-wire ammeter. If you have something else, write me. Thomas W. Braidwood, P. O. Box No. 191, Angelsea, N. J.

FOR SALE—Electro ½ Kw. transformer coil, \$3.00; 1 Kw. Thordarson, needs new secondary, \$10.; oscillating audion in large genuine mahogany cabinet, potentiometer control, including bulb, \$15.00; primary and secondary tubes, Clapp-Eastham, 15,000 meter coupler, green silk wound and tapped, cost \$7.45, sell for \$4.50. Ruel C. Hanks, 17 Crosby Street, Augusta, Me.

FOR EXCHANGE—Twelve volt, 80 amp. hour Exide battery for 1 Kw. transformer. Also have \$16.00 Omnigraph, Halcut wave meter, slide plate variable (Murdock) and other sundries. Want Brandes Navy phones, tubular bulb or A. C. voltmeter. Address E. Shore Watkins, 5245 Magnolia Ave., Chicago, Ill.

FOR SALE—Brand new phones, best make, guaranteed perfect. Good pair of 20 amp. hour storage battery plates, charged once, good shape, make offer. Two 5,000 meter oscillating loading coils, best grade copper wire windings, \$2.00 each. **WANT**—Spark coil, perfect condition, two or three inch capacity, must have high speed vibrator and good platinum points. State cash price.

Also want RJ4 audion boxes, must be in good shape and not scratched up or otherwise damaged, complete with grid condensers, switches, rheostats, and bulb brackets. State lowest cash price. Wm. F. Justus, 273 S. Monroe Ave., Columbus, Ohio.

FOR SALE—New aluminum aerial wire No. 12 about 830 ft., \$1.80. Old style box, 4x5 camera with plate holders, size of camera 7x8-1/2. Takes fine pictures. Will sell for \$6.00. A fine four stop accordian, hardly ever used, cost \$6.00, will sell for \$4.50. All correspondence immediately answered. H. R. Hick, Rocky Hill, Conn.

FOR SALE—A complete sending and receiving outfit for wireless telegraphy including electrolytic interrupter, and kick-back preventer; also 1/2 Kw. open core sending transformer for use on 110 V circuit. Set is listed in Wm. B. Duck's catalogue, No. 10, Page No. 90, Set No. D-29. Full particulars by writing to Wm. C. McLott, Box No. 404, Plymouth, Mich.

FOR SALE—One-half inch spark coil sets, complete with best 1/2 inch coil made, key, condenser, and gap, all mounted up on finely finished base. Just the thing for the fellow who hasn't the A. C. Price, \$4.75. Also have many other instruments for sale. List and prices on request. Hodge Alexander, 531 Center St., Grove City, Pa.

FOR SALE OR EXCHANGE—One 1,500 meter loose coupler, \$3.00; one wireless key, \$.90; new Electro tuner, \$2.75; one section Blitzen condenser, \$1.75; one helix, \$1.25; pair 2,000 ohm phones, \$1.50. Would like a new type Thor-darson transformer and a kick-back preventer. Walter Koyen, Woodbridge, N. J.

FOR SALE—One Clapp-Eastham \$45. receiving set, \$15.00; 1 Kw. 60 cycle transformer, (Clapp-Eastham) \$25.; 1/2 Kw. condenser in mahogany cabinet, \$6. each; one pancake type oscillation transformer with Clapp-Eastham hot wire me-

ter suitable for one Kw. set, \$12. complete; one series ground condenser with three variations, \$3.00; one set protective condensers, \$2.00. E. C. Wahl, 60 Stewart Ave., Buffalo, N. Y.

FOR SALE—One \$6.50 E. I. Co. Vario-Selective coupler in A1 condition. Will sell for \$5.00. H. Rouclere, Hotel Rouclere, Ridgewood, N. J.

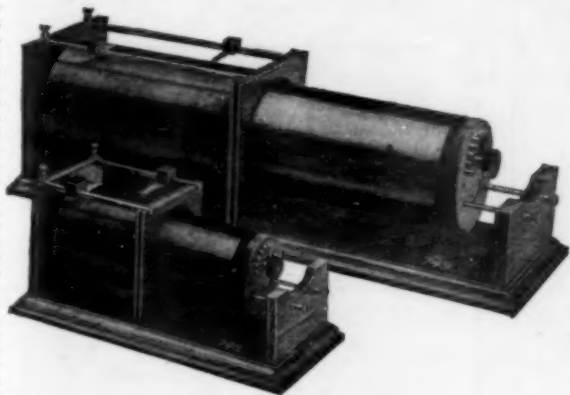
FOR SALE—Owing to the fact that I am having to discard my shop, I have the following for sale. All things offered guaranteed to be new or in A1 condition. One 1/2 H. P. A motor, 110 v., one 6V6A motor generator (new); one Goodell-Pratt No. 29 lathe (new), cost \$9.50, sell for \$6.00 delivered; one Bench drill press, (new) cost \$8.00, sell for \$6.00.; one two-cell 4V40A storage battery, several variable condensers; one set new Brandes cracked head band; one Blitzen short wave receiving transformer, price new \$15., will sell for \$7.00. Write me for other prices and what you want. See what I can offer you. Don I Shepherd, St. John, Kans.

FOR SALE—3,500 meter audion cabinet receiving set, consisting of the following instruments: 1,500 meter receiving transformer, two 1,000 meter load coils, with switch for using either one or both, or the receiving transformer alone. Fixed and variable condensers, audion detector, and pair of 3,000 ohm phones. Entire set of Clapp-Eastham make. If taken at once high voltage B batteries for audion are still in good condition and all test full four volts each. First \$40. takes it. Brand new audion, RJ4, panel type; have bill of sale to show have had it one week, Jan. 22nd. Cost \$14., will sell for \$12. 1/2 Kw. transformer coil with vibrator, cost \$8.50, will sell for \$4.00. As good as new. Burnice Rutt, Casey, Ia.

FOR SALE OR EXCHANGE—A fine receiving pack set tunes to 5,000 meters, in first-class condition; also 2,000 ohm single phone, never used, \$1.85. All letters answered. Henry Kirby, Madrone, Cal.

New Undamped Wave Coupler, No. 749

Special Introductory Price, \$18.00



Our new Coupler No. 749 is 32 in. long, 9 in. wide and 10 in. high over all, and on the average sized antenna tunes up to 15,000 meters. This Coupler, used with the new CHAMBERS' SYSTEM OR CIRCUIT will bring in signals from domestic and foreign Are Stations surprisingly loud and clear. Note the difference in size of our No. 748 and the new No. 749.

We claim to be the original inventors of a SYSTEM OR CIRCUIT, for the reception of the undamped waves without the use of Loading Coils or Oscillating Coils, as they are sometimes called; as with our system or circuit only two inductively coupled coils are necessary. Circuit supplied with each coupler.

This CHAMBERS' CIRCUIT saves you money. Think of it! No extra coils to pay for, and price of coupler only \$18.00.

Place order now so as to be in on the introductory price. Orders filled in rotation. Send for descriptive matter.

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Announcing the DeForest Tubular Audion Bulb

"There is only one Audion-the De Forest"

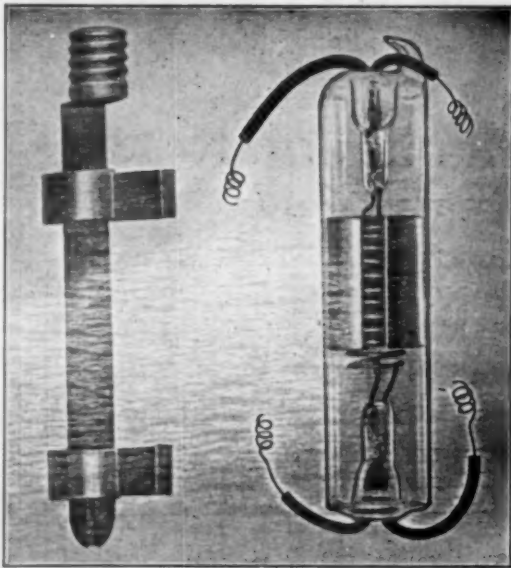
The New Type T Tubular Audion Bulb gives very loud signals from powerful stations. It has a large cylindrical plate, a spiral grid and only one filament of tungsten. As this is a long straight-line filament, it has a long life. Edison effects are completely eliminated. The plate is in contact with the heavy glass tube, preventing overheating.

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The special adapter fits this type to the screw base receptacles of De Forest apparatus, and is furnished at 40 cents extra.

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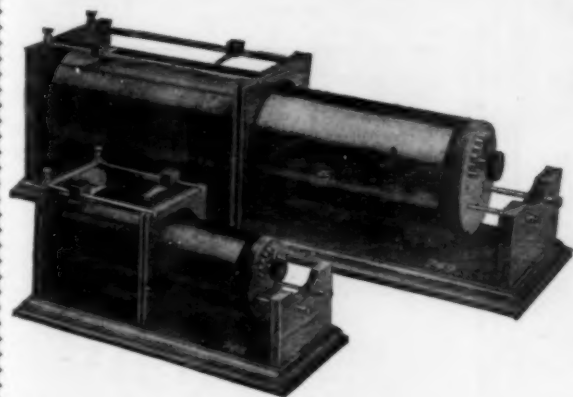
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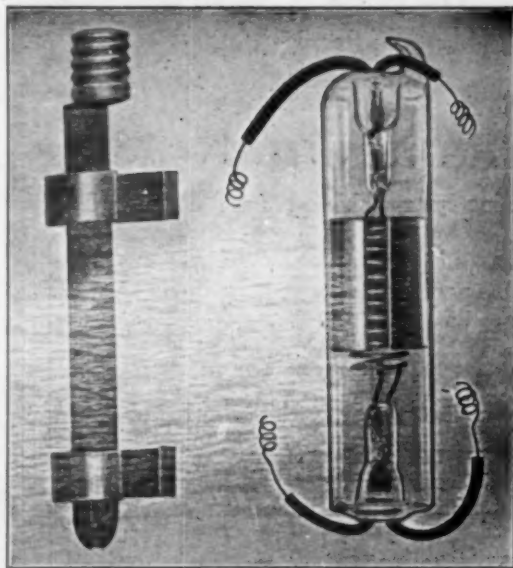
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Sold Separately, \$5.50 each

The special adapter fits this type to the screw base receptacles of De Forest apparatus, and is furnished at 40 cents extra.

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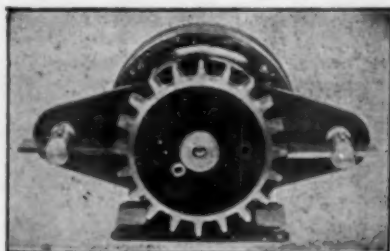
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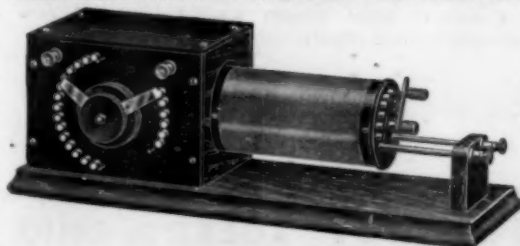
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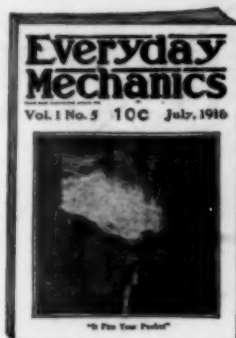
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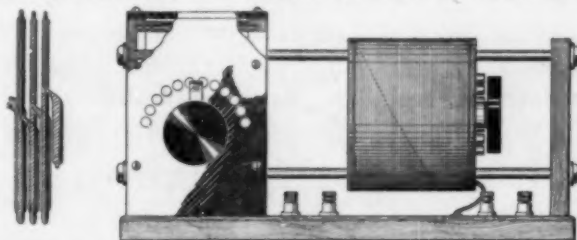
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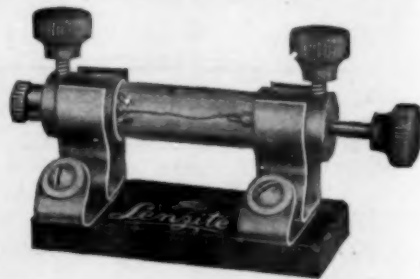
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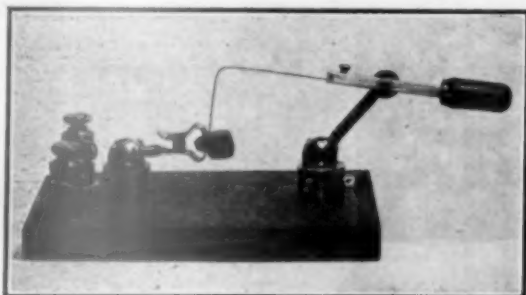
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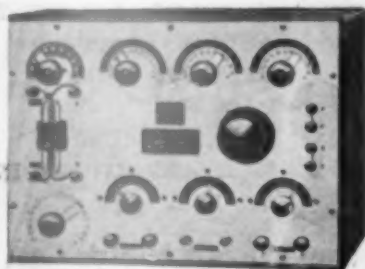
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MIGNON UNDAMPED WAVE

Wireless Apparatus

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Mignon Wireless Corporation

Elmira, N. Y., U. S. A.



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M. A. F. SHORT WAVE REGENERATIVE ATTACHMENT.

When this instrument is attached to your present loose coupler and Audion you will be able to receive those long distance relay messages. The circuit used is so extremely sensitive that it is possible to pick up the faintest signals and also wireless telephone messages, both of them being amplified many times. That this instrument is so vastly superior to anything now in use, that you can hardly institute a comparison with any other, you will admit after you have had the pleasure of trying it out.

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"Your M. A. F. short wave regenerative set is a wonder, it not only amplifies all signals, but I can hear plainly many 8 and 9 District stations. Using the set as a wireless telephone transmitter I have been heard and understood more than two miles away."

Size of Panel 8x12 \$22.50

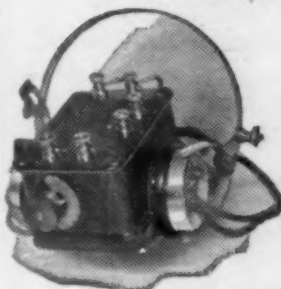
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Works on both damp and undamped signals.

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TWO-STEP M. A. F.



The finest amplifier that is made. You don't know what wireless signals are until you have heard a Two-Step M. A. F.

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It is air-tight. It is practically permanent.

The M. A. F. Detector Stand is the latest development of a detector stand and has the three essential points desired in a mineral detector, that is an air-tight chamber which will prevent dust from collecting on the mineral thereby detracting from its sensitivity, also a detector

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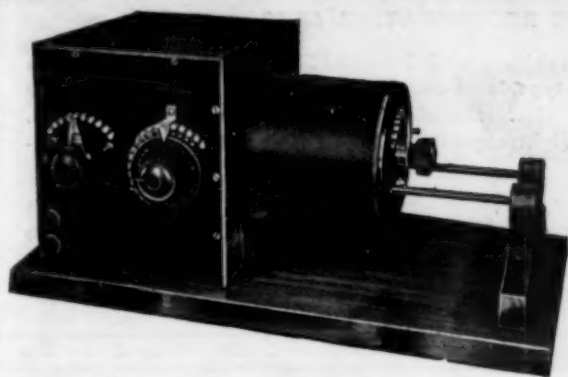
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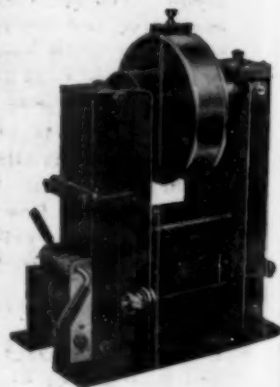
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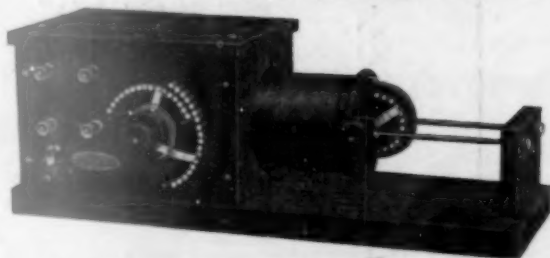
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